pp. 729–800] [November, 1942

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Main Contents :

SUMMARY OF RECENT ABSTRACTS :
IX. LEPROSY.

MALARIA. TRYPANOSOMIASIS.
LEISHMANIASIS.
FEVERS OF THE TYPHUS GROUP.
YELLOW FEVER. PLAGUE.
CHOLERA. AMOEBIASIS.
LEPROSY. HELMINTHIASIS.
DEFICIENCY DISEASES.
HAEMATOLOGY.
VENOMS AND ANTIVENENES.
DERMATOLOGY AND FUNGOUS DISEASES.
MISCELLANEOUS.

For detailed Contents see pp. ii, iv, v & vi.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 39.] 1942. [No. 11.

SUMMARY OF RECENT ABSTRACTS.*

IX. LEPROSY.

Epidemiology.

A number of surveys are included in the reports under review. For clarity and convenience the findings are set out in tabular form :—

Leprosy Surveys.

Authors	Page	Locality	Incidence per 1,000 population	Proportion of lepromatous cases per cent.	Proportion of child cases to total cases per cent.
DAVEY	21	S. Nigeria ...	33		
DEGOTTE	458	Belgian Congo Ituri	52·9	8·61	10·35
MALHOTRA ...	698	Punjab (Kangra district)	1·0	54	8
HAYWARD... ...	456	Rajputana ...	0·8	43·81	5·4
CHANDY	698	United Provinces Fyzabad		about 33	
LOWE & SANTRA ...	21	N. Bengal ...	74	4·1	low
BUKER	217	Burma Shan villages ... Lahu villages ... Chinese village...	 36 142 *Nil*	 37·6	
MALAIHOLLO ...	457	W. Java ...	38	11	
ARAUJO & DE ALBUQUERQUE	458	Rio de Janeiro Native Brazilians Brazilians born of foreigners ... Foreigners ...			 37·9 45·0 5·0

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1941, Vol. 38. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

No general deductions can satisfactorily be drawn from this table beyond the bare facts of incidence. There seems to be no constant correlation between high incidence and the proportion of lepromatous cases, nor between high general incidence and the proportion of cases in children.

The high incidence in the Belgian Congo is shown by the fact that during 1939 there were 74,397 known cases, 10,000 of which had been discovered during the year. Incidence rates for the Ituri district are given by DEGOTTE (p. 458, see table above).

In Ceylon, DE SIMON (p. 456) reports that 85 per cent. of cases are found within 5 miles of the humid coast, in the area which is most densely populated.

MALAIHOLLO (p. 457) notes that in Wates, W. Java, leprosy appears still to be spreading, though in general it is benign in character. There is a high rate of household contact cases.

ARAUJO and DE ALBUQUERQUE (p. 458) find that a high proportion of leprosy cases occur in childhood in natives of Brazil, but that in immigrant foreigners the highest incidence of onset is in adult life. They argue that foreigners from countries where leprosy is no longer endemic are as susceptible as, or even more susceptible than, the children of endemic areas. MOTTA and COSTA (p. 699) in the district of Rio de Janeiro note that of the cases recently investigated, 5·2 per cent. were in children [but they do not state what proportion of the adult cases started in childhood], and that of the total cases 64·7 per cent. were in an infective state.

From a consideration of the leprosy in New Brunswick, Louisiana and Minnesota, AYCOCK (p. 21) concludes that in these areas hereditary susceptibility is a major factor in propagation rather than family contagion. [This is not a common opinion; most workers consider that close contact is a more potent force than any other in the epidemiology of leprosy.]

ROGERS *et al.* (p. 20) contribute a note on the lepers at present known in the British Isles.

Aetiology.

COLLIER (p. 22) has made a contribution to the subject of the influence of a diet of Colocasia on the incidence of leprosy, a subject which has been stressed in recent years by German workers. In a preliminary report on experiments with monkeys he states that in animals fed on a diet of Colocasia, or receiving injections of sapotoxins, the inoculation of human leprous material produced lesions which were not found, at the time of writing, in controls. A fuller account of the experiments is given on p. 459.

Attempts to infect animals with material from cases of human leprosy have been made, with varying degrees of success. DHARMENDRA and LOWE (p. 217) have been unable to confirm the work of ADLER and BURNET, in that they have failed to produce progressive infection in Syrian hamsters by inoculation of human leprous material, whether splenectomy had been carried out or not. ARAUJO (p. 218), however, found numerous leprosy bacilli, in small groups, in the blood, liver, spleen, kidneys and axillary glands of a hamster (*Cricetus cricetus*) inoculated subcutaneously one month before with material from a human leproma. NONAKA (p. 224) has injected human leprous material into chickens and reports some leprous

changes in liver and spleen as well as at the site of injection. These changes occurred, but more slightly, on subinoculation to another fowl, but the third generation failed to produce lesions. Heated material did not produce visceral changes. OTA and NITTO (p. 461) have, however, obtained better results and have subinoculated human leprosy material through seven passages in hens by intramuscular injection. They describe their technique. The affected muscles contained yellow spots, and acid-fast bacilli were found in large numbers. These changes increased slowly and persisted for more than one year, but in later passages the lesions developed more quickly. Round-cell infiltration and large vacuolated cells containing acid-fast bacilli were demonstrated; that the bacilli were not tubercle bacilli was proved by the negative results of guineapig inoculation and culture experiments. The authors consider that their method furnishes the essentials for chemotherapeutic experiments to find a more effective treatment than is at present available. These authors (p. 462) have used the tissues of hens (of the second and fifth passages) for the preparation of lepromin, and have succeeded, in human leprosy, in obtaining results, with this lepromin, almost equal to those found with the original Mitsuda reaction.

CHAUSSINAND (p. 699) has attempted to cultivate *Myco. leprae* on a large number of media. All the experiments failed with the exception of one, in which a growth believed to be that of the leprosy bacillus was obtained. Subculture, however, was unsuccessful. The composition of the medium is to be described later.

Pathology.

COWDRY (p. 23) discusses the development of the globi, or masses of leprosy bacilli, in the giant (foam) cells. He concludes that these giant cells are derived from components of the reticulo-endothelial system.

STEIN (p. 221) draws attention to an affection of the follicular structure of the skin in leprosy which, though not previously described, he has seen in one-third of his cases. There are yellowish brown, sunken follicular spots, with atrophic epithelium and specific granulomata with lepra cells and bacilli, which rapidly destroy the hair follicles. They are commonest on the legs and may be the starting points of lepromatous granulomata.

PRENDERGAST (p. 465) has made a study of the eye in leprosy. The cornea is the most vulnerable tissue, and commonly shows infiltration of the deep layer of the stroma. The iris may become fibrotic and atrophied, but in the ciliary body and sclera the lesions are less extensive; in the retina, optic nerve and lens they are rare.

TORSSUJEW (p. 462) discusses the changes which take place in the cutaneous nerves in leprosy; these cannot be further detailed.

In nerve leprosy OBERDOERFFER and COLLIER (p. 220) found, by X-ray examination, that bone atrophy took place in bones the muscular insertions of which were supplied by the nerves most frequently damaged by the disease. They assume that the disturbances of nutrition which cause these changes are due to inactivation of the muscles concerned, and advocate purposive training of those muscles.

Clinical findings.

DAVEY (p. 706) has followed the course of the disease in 118 lepers in Nigeria who did not receive any treatment during the period of the

investigation, which lasted for two years. There were 18 deaths, six of them from smallpox, but 67 per cent. of the remaining cases were stationary or had improved at the end of the time ; most of those in which there was improvement were of the neural or tuberculoid type.

During recent years the frequency with which leprosy may be abortive has increasingly been emphasized, and LOWE and CHATTERJI (p. 701) draw attention to the fact that such cases are common in India. Most of these cases are of the neural type, and a description of one is given. Leprosy rarely commences late in life, and when it does, is usually mild. The same authors (p. 701) describe the onset of a case in an Indian aged 70.

WADE (p. 464) notes that it is rare for the tuberculoid form of leprosy to be transformed into the lepromatous type, but in relapses the bacilli become more numerous in the lesions, and this may lead to the suspicion that the form is lepromatous. COCHRANE (p. 464) also supports this view, pointing out that his patients who became lepromatous were probably not tuberculoid in the first instance, because they had been consistently negative to lepromin. These cases he describes as intermediate, and gives in a table the differential characters of tuberculoid and intermediate cases. VELASCO (p. 702), however, records two cases in which tuberculoid lesions developed into the lepromatous form. Such cases are rare. LOWE and CHATTERJI (p. 700) have enquired into the development of lepromatous cases, and find that two-thirds of the cases investigated started with lesions which suggested disease of the neural type. Some apparently developed from tuberculoid lesions, but in view of the frequency of tuberculoid disease in Calcutta, they consider that major tuberculoid lesions rarely become lepromatous (thus agreeing with WADE and COCHRANE, above). The average duration of the neural phase is 3–4 years, and neural cases of long standing rarely become lepromatous.

HOFFMANN (p. 222) draws attention to possible mistakes in diagnosis due to the finding of non-pathogenic acid-fast bacilli, originating from soil or water, in the nose, mouth, urine or in ulcers of the limbs. Leprosy, therefore, should not be diagnosed in the absence of clinical symptoms. Such saprophytic bacilli may often be cultivated on ordinary media, and this provides a good differentiation from leprosy bacilli ; their morphological appearances differ from those of *Myco. leprae*. [It is worth remembering that acid-fast bacilli may be found in the scrapings from cold water taps and in old collections of distilled water. Water used from such sources and in procedures which involve centrifugation is likely to yield acid-fast bacilli in the sediment, and these may wrongly be attributed to the substances examined.]

DHARMENDRA and BOSE (p. 702) have carried out complement fixation tests in leprosy, using as antigens preparations of six acid-fast bacilli including the so-called leprosy bacilli of Duval, Bayon, Kedrowsky and Lleras. They conclude that these tests have not given, and are unlikely to give, any evidence regarding the genuineness of cultures of organisms isolated from leprous lesions. [It will be remembered that LLERAS ACOSTA (this *Bulletin*, 1938, Vol. 35, p. 551) isolated an acid-fast bacillus from cases of leprosy, and obtained a high proportion of positive results in lepers with a complement-fixation test in which this bacillus was used as antigen. SAENZ (*ibid.*, p. 887), however, obtained similar results with an acid-fast bacillus isolated from tap water, and other workers have achieved positive reactions with other saprophytic acid-fast bacilli.]

EAGLE *et al.* (p. 703) confirm the results reported by CAPPELLI, that in leprosy the complement fixation test, in which the antigen is a suspension of cultured *Spirochaeta pallida*, is negative. By the use of this test, therefore, the frequently positive Wassermann reactions found in non-syphilitic lepers can be differentiated from the true syphilitic reactions, in which there is response to both tests [but see KOLMER *et al.*, *Bull. of Hyg.*, 1942, Vol. 17, p. 726].

The *lepra reaction* is regarded by many workers as an allergic phase of the disease. Thus ERMAKOVA (p. 25), from histological examination of lepromatous material taken during the stage of lepra reaction, considers this state to be a manifestation of allergy. A description of the findings is given. Similarly BÜNGELER and FERNÁNDEZ (p. 219) describe the histological appearances in the spontaneous reaction of tuberculoid leprosy and in reactions in the same condition, artificially induced by means of lepromin. These appearances lead the authors to the conclusion that tuberculoid leprosy is essentially a state of permanent hypersensitization, with a high degree of immunity against leprosy infection. NOLASCO (p. 25), however, differs from these workers in his view of the nature of the lepra reaction. He found the lepromin test to be positive in only 4 of 48 lepromatous patients tested while in the state of lepra reaction. There is apparently no relationship between the intensity of the test and the presence of the lepra reaction, and the author cannot, from these findings, support the view that the lepra reaction is a manifestation of allergy. He (p. 220) gives a description of the histological appearances at the site of injection of lepromin in lepromatous cases in the state of lepra reaction.

ARCHER (p. 222) noted a greatly increased proportion of lepra reactions in the inmates of a leper home shortly after vaccination against smallpox. The reactions were more severe than usual, and all occurred in patients who had been vaccinated.

COCHRANE *et al.* (p. 703) state that "it can generally be concluded that the *lepromin reaction* gives an indication of the allergic response of the tissues of the body to the bacillus of leprosy or its products." In a series of tests carried out in a leprosy sanatorium they found positive results in 60 per cent. of neural cases, 100 per cent. of tuberculoid cases and in 86 per cent. of healthy persons. No case of lepromatous disease was positive. Leprous children with a history of contact tend to show fewer positive reactions the more close the contact, but healthy children of lepers are often positive. There is evidence that the lepromin reaction is not significantly influenced by possible family predisposition. The authors consider that the more intimate the contact in early life the more likely is cellular resistance to be broken down.

BERNY and MAUZÉ (p. 24) describe an intradermal test which they have found to give positive results in all the lepers tested (in all stages of the disease) but not in any of the controls. The antigen is an alcohol precipitate of the urine of patients with leprosy, dried and redissolved in saline; to this solution ammonia is added and after filtration it is adjusted to *p*H 6·4–6·6.

Treatment.

MUIR (p. 223) notes that in nerve cases there is high tissue resistance, with intense cellular reaction, whereas in lepromatous cases resistance is deficient. Treatment of lepromatous cases, therefore, should aim at

stimulating the tissue cells, and in this, measures to improve the general health are important. A summary is given of the drugs commonly used, but it is admitted that their actions are not fully understood. The same author (p. 223) gives details of treatment of the nasal cavities in leprosy.

COLLIER and MCKEAN (p. 26) instituted a treatment of leprosy, with diphtheria antitoxin or toxoid, which was based on the theory, advanced by OBERDOERFFER, that suprarenal insufficiency predisposes to leprosy infection. It is known that diphtheria toxin damages the suprarenals, and antitoxin therefore may protect them. It was in the hope that diphtheria antitoxin might neutralize leprosy toxin, in the toxaemic stage of the leprosy reaction, that its use was commenced. Toxoid was tried later. In about 50 patients who were experiencing repeated lepra reactions, treatment with antitoxin gave good results, with reduction of nodules, rapid improvement of the reaction, return of sensation to previously anaesthetic areas and fragmentation of bacilli. In controls treated with anti-tetanus serum or antivenene no such improvement was found. Diphtheria formol toxoid produced results as beneficial as those given by antitoxin.

The best results were obtained in lepromatous cases, but improvement was seen in nerve cases also. In comment, however, the Editor of the *Leprosy Review* notes that in a control series COLLIER subsequently reported that under chaulmoogra treatment alone a somewhat similar result was obtained.

In a later communication COLLIER (p. 704) reports that in over 600 cases of leprosy treated with diphtheria toxoid the results far exceed any achieved by other means.

MOISER (p. 704), however, obtained such poor results with diphtheria anatoxin (Ramon), in a small series of cases, that he was compelled to stop the treatment at the request of the patients. In a comment to this paper ROGERS notes that unpublished results from other workers do not confirm the claims of COLLIER and his co-workers, and that the use of chaulmoogra is apparently more efficacious. [Further reports summarized in this *Bulletin*, 1942, indicate that toxoid treatment has not found much favour, and that there is lack of any proof that in leprosy there is any deficiency of suprarenal function.]

COLLIER (p. 467), working on Oberdoerffer's theory that the essential predisposing factor in leprosy is " adrenocortical insufficiency, enhanced by adreno-toxic sapotoxins from food plants " [especially Colocasia] has treated leprosy by diathermic stimulation over the kidney region, and reports definite improvement and a reduction in the incidence of lepra reactions.

DAVISON (p. 466) has obtained some evidence of improvement in neural cases of tuberculoid type from the use of Grasset's endotoxoid prepared from *Myco. tuberculosis* by repeatedly freezing to —30°C. The assumption was that there may be a group antigen common to both leprosy and tubercle bacilli.

KUZNEZOV (p. 705) writes of the value of the naphthalan oil baths used in the Caucasus ; the treatment is reputed to give stable results in almost all cases, with more rapid improvement than with any other treatment employed.

DAVISON (p. 705) has used blood transfusions in treatment, but has found no evidence of permanent benefit from them.

COCHRANE *et al.* (p. 27) note that wheat in place of rice in the diet of lepers in India appeared to afford relief from the painful neuritis and

from bone and joint pains, without causing improvement in the lepromatous condition.

BALIÑA and BASOMBRIO (p. 705) have been favourably impressed with the results obtained by the removal or destruction, by electrical methods, of solitary lesions in tuberculoid leprosy. All the patients received regular chaulmoogra treatment as well.

In the treatment of eye lesions PRENDERGAST (p. 465) has found protein shock useful in the acute stages. Quinine bisulphate ointment and thyroxin applied locally are useful in clearing up corneal infiltrations.

MUIR (p. 706) advocates the treatment of lepromatous ulcers by means of local applications of gentian or methyl violet, followed by 10 per cent. silver nitrate and finally by 15 per cent. tannic acid. With this treatment the ulcers rapidly begin to heal.

The packing of perforating ulcers with urea, or the instillation of a saturated solution into sinuses, has proved successful in the hands of SLOAN (p. 706) in a high proportion of cases.

Control.

In the *International Journal of Leprosy* (p. 27) there appeared an editorial devoted to the subject of travel by lepers and the laws governing this question in various countries. The opinions of a number of authorities on leprosy are cited; these cannot be abstracted further, but the general impression is that the regulations at present in force limit the movements of lepers in ships and railways, and restrict immigration of lepers, to an unnecessary degree.

DAVEY (p. 21) gives an account of the control work carried out by the Uzuakoli Leper Colony in S. Nigeria. From this centre, clinics and segregation villages have been instituted over a large area, and regular visits for purposes of treatment are paid to these places by the staff of the central institution. Obvious improvement in the condition of many patients has taken place. At each clinic there is a leper nurse, and leprosy inspectors are being trained; courses in leprosy are given to sanitary inspectors and to school teachers.

Village segregation is practised in an area of S.E. Nigeria, and DAVEY (p. 706) reports that over a period of two years the incidence of the disease fell appreciably, probably owing to the isolation measures. He notes that these measures were begun by the natives themselves 10 years ago, and that the isolated persons live happily in the model village they have constructed. In the Belgian Congo (p. 457) segregation is only partially employed, but the authorities are aiming at isolation villages of not more than 400 inhabitants, with land for agriculture, dispensaries and hospitals. These will subsist on their own resources, and will be administered according to local custom. DEGOTTE (p. 458) gives an impression of the value of village isolation in the Belgian Congo. Where this has been carried out with efficiency the cases are only one-third as numerous as elsewhere. He concludes that village isolation is the best method of combating leprosy in the area with which he is concerned. HAYWARD (p. 456) considers that leprosy is not decreasing in the State of Jodhpur. The resources of the State cannot, at present, afford the means for isolation of all the known cases, and the author, therefore, advises the institution of small colonies in the villages so that at least partial isolation can be carried out, with treatment as out-patients at existing

hospitals and dispensaries [much after the manner of the Uzuakoli organization in Nigeria].

In Ceylon compulsory segregation has been abandoned since 1932. DE SIMON (p. 456) reports that repeated examination of all contacts is now carried out, and that home isolation is permitted in certain cases. Patients discharged after bacteriological findings have become negative are regularly supervised in their homes. Leprosy hospitals and settlements have been established, at which modern treatment is given. MALAIHOLLO (p. 457) notes that in Java some of the lepers have, of their own initiative, adopted the practice of house isolation; this system is to be encouraged.

SITANALA (p. 28) notes that in the Netherlands Indies there are 47 leprosaria harbouring about 5,000 lepers.

ROGERS (p. 707) shows that in Korea, where male lepers refuse to enter colonies unless accompanied by their wives, and where, therefore, children are born, the problem has been solved by voluntary sterilization of the men. At a leper colony in Burma BUKER (p. 28) notes that homes are provided for uninfected children, and that any male leper in the colony who wishes to marry must first be sterilized. He reports that there are now 10 colonies in Burma (p. 217).

ARAUJO (p. 224) gives an account of the leprosy preventoria in Colombia. *Charles Wilcocks.*

MALARIA.

RAM (L. M.). **Malarial Survey of Stann Creek District with Relevant Observations on the Incidence of Malaria in British Honduras.**—*Jl. Trop. Med. & Hyg.* 1942. Feb. 2. Vol. 45. No. 3. pp. 18–24. With 3 charts & 4 maps.

Stann Creek is one of the five districts of British Honduras, and has a mixed population of 6,347. The average (1935–39) birth rate was 32; the death rate 16, and the infant mortality rate 100. Malaria is more widespread and severe in Stann Creek than in other districts of the colony. The spleen rate of 1,214 school-children in 1940 was 22 per cent. *P. falciparum* is more prevalent than *P. vivax* in the proportion of three to two. Occasional infections with *P. malariae* are found. July to October is the season of most active transmission. Six species of Anopheles have been found in the Stann Creek District —*A. albimanus, A. apimacula, A. darlingi, A. punctimacula, A. vestitipennis* and *Chagasia bathanus*. *A. albimanus* is the most widely distributed. *A. darlingi* has been found only in certain rural areas in Stann Creek and Toledo Districts. One naturally infected specimen of *A. vestitipennis* was found. *Norman White.*

VENHUIS (W. G.). *Anopheles aconitus* aan kaliwanden. [*A. aconitus* **on Stream Banks.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1942. Jan. 20. Vol. 82. No. 3. pp. 99–112. With 3 figs. on 1 plate. [15 refs.] English summary.

"After the description in a previous article of the capture of many *An. maculatus* on stream-banks, in the present article a description is given of the ease with which *An. aconitus* in East-Java can be found

on stream-banks in great numbers, sometimes far more than in houses.

"On two occasions the vector species could be found only by making use of the stream-bank catches.

"Besides *An. maculatus* and *An. aconitus* the following species are apt to be found on stream-banks: *An. minimus* var. *flavirostris*, *An. kochi*, *An. leucosphyrus*, *An. tessellatus* and *An. vagus*. On the other hand *An. barbirostris*, *An. hyrcanus*, *An. annularis* and *An. subpictus* are seldom seen and seem to have still other day resting-places.

"There is much evidence that the success of catches in natural shelters depends on the presence or absence of suitable resting places in houses and stables and whether steep, dark and damp stream-banks are available or not.

"In the literature sometimes natural shelters are mentioned as day resting-places and sometimes very good results have been reached.

"Nevertheless the search for anopheles adults in natural shelters has not drawn the attention it deserves.

"So the adoption of a method, by which the combination of house-, stable- and stream-bank catches is practised, is strongly emphasised."

VENHUIS (W. G.). Geinfecteerde *Anopheles minimus* var. *flavirostris* aan kaliwanden. [**Infected** *A. minimus* **var.** *flavirostris* **on the Banks of Streams.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1942. Feb. 3. Vol. 82. No. 5. pp. 190–194. English summary.

"During a survey at the end of an epidemic, presumably caused by *A. aconitus*, 258 *A. minimus* var. *flavirostris* were captured on stream banks; 235 midguts were dissected and 3 of these showed a fair number of middle-sized oocysts. No sporozoites were found.

"In the last months 5 midguts of this variety showed oocysts, four from stream banks and one from a house.

"In the course of four years from 1937 to 1940 inclusive in East Java 511 midguts and 673 thoracic fluids of *A. minimus* v. *flavirostris*, from houses and stables only, were examined and none of them was found infected except one midgut in October 1940.

"Usually the adults of this variety are rare in houses and few in stables, even when larvae are abundant in the vicinity.

"Still the variety seems to be less "wild" than was thought for East Java because the adults are easily captured on stream banks and amongst these infected specimens were found."

CORRÊA (Renato R.) & RAMOS (Alberto da S.). Do encontro do *A.* (*N.*) *darlingi* Root, 1926, e do *A. oswaldoi* var. *metcalfi* Galvão & Lane, 1937, naturalmente infetados com os parasitas maláricos, na região sul do estado de São Paulo. [*A. darlingi* and *A. oswaldoi* **var.** *metcalfi* **found Naturally Infected in the Southern Part of the State of São Paulo.**]—*Folia Clin. et Biol.* São Paulo. 1941. Vol. 13. No. 6. pp. 183–191. With 5 figs. [11 refs.] English summary.

In the southern part of the State of São Paulo *A. darlingi* was the prominent anopheline captured in houses in Taquari, near the bank of the river of the same name. Oöcysts were found in two of 33 females dissected. This species was found breeding along the margins of the Tarquari River among the leaves of *Eichornia azurea*.

In two places in the Ribeira District *A. oswaldoi* var. *metcalfi* could readily be captured biting man in the proximity of houses though it was not found inside human dwellings. Of 24 so captured and dissected, two harboured oöcysts.

Two excellent photographs of the eggs of these two species of Anopheles are reproduced. *Norman White.*

COUTINHO (J. O.). O "Anopheles (N.) oswaldoi metcalfi" Galvão e Lane, 1937 e o "Anopheles (N.) albitarsis" Arribalzaga, 1878 como transmissores de malaria no Distrito Federal. [*A. oswaldoi metcalfi* **and** *A. albitarsis* **as Vectors of Malaria in the Federal District.**]—*Brasil-Medico.* 1942. Jan. 31. Vol. 56. No. 4 & 5. pp. 52–55. With 3 figs. [11 refs.]

This paper opens with a discussion of the validity of the species *A. oswaldoi* and its relationship to *A. tarsimaculatus.* The author considers that the *metcalfi* variety of *A. oswaldoi* described by GALVÃO and LANE in 1937 is a valid species; its eggs differ from the description given by ROOT, 1926. In the neighbourhood of Lake Tijuca in the Federal District of Brazil, in November and December, *A. oswaldoi* formed 76 per cent. of the Anophelines captured in houses, and 93 per cent. in pig-sties. *A. albitarsis* constituted 19 per cent. of the anophelines caught in houses and 3·4 per cent. in pig-sties. Oöcysts were found in 9 of 307 *A. oswaldoi metcalfi* dissected, and in 1 of 150 *A. albitarsis.* *Norman White.*

KOMP (W. H. W.). **The Species of Nyssorhynchus Confused under Tarsimaculatus Goeldi, and a New Name,** *A. emilianus,* **for One Species found in Para, Brazil (Diptera, Culicidae).**—Reprinted from *Ann. Entom. Soc. America.* 1941. Dec. Vol. 34. No. 4. pp. 791–807. With 8 figs. [22 refs.]

ROSINGER (Z.). **Preliminary Notes on Malaria Resistance.**—*East African Med. Jl.* 1942. Feb. Vol. 18. No. 11. pp. 324–335.

This is an interesting discussion covering a wide range. No new facts and but few original observations are recorded but the author writes from large experience. Malaria prophylaxis, malaria treatment, biological resistance to malaria, and immunity are considered, but it is not possible to summarize a discursive contribution of this kind. The questions raised confirm the impression "that our continuous emphasis on attempts to solve the malaria problem by endless work and discussion on prophylaxis and the comparative efficiency of the different malaria drugs, have led us into a *cul-de-sac*; and that in looking for a way out of it, we are using up valuable time and energy, part of which could more profitably be employed in investigating humoral pathology, serology, and the problem of immunity in malaria." *Norman White.*

PRIEST (Robert). **Meningococcal Septicaemia resembling Malaria.** [Memoranda.]—*Brit. Med. Jl.* 1942. Aug. 1. p. 129. With 1 chart.

The patient was a soldier who had never served outside the United Kingdom. The chart of his temperature shows marked periodicity, strictly quartan in type (except on one occasion), with remissions to normal between the peaks. The patient complained of pain in the splenic area. Malaria parasites were not found in the blood and the

fever did not respond to quinine. On two occasions erythematous spots were seen on the abdomen, and there was a suggestion of erythema nodosum on the legs ; during the paroxysm there was leucocytosis to 22,000 with polymorphonuclear increase. No meningococci were cultured from the blood, but the fever responded dramatically to sulphapyridine. A diagnosis of meningococcal septicaemia seems to be justified [though definite proof is lacking] and the author recalls the rule "when you see erythema nodosum, think of meningococcal septicaemia."

[It should also be borne in mind that quartan malaria may be transmitted by the transfusion of blood from a donor who has had that disease, even though no parasites may be seen in stained films, and even though many years may have elapsed since residence in a malarious area. In blood stored at low temperatures, parasites may live for days or even weeks. See this *Bulletin*, 1940, Vol. 37, pp. 362, 456 ; 1941, Vol. 38, p. 505.

For a further comment on this case, see the note by Sir John Megaw on the paper by Jacobi, below, p. 758.] *C. W.*

Yorke (Warrington). **The Diagnosis and Treatment of Malaria in England.**—*Brit. Med. Jl.* 1942. July 18. pp. 61–63. With 6 figs.

In this concise paper the author deals with the clinical aspect of malaria, bringing out with clarity the essential features of the three principal forms, and emphasizing the seriousness of malignant tertian fever. The standard treatment adopted at Liverpool consists of 10 grains of quinine sulphate (with m.xx. acid sulph. dil. in ½ oz. of chloroform water) three times a day for four days, followed by 20 grains of quinine each Saturday and Sunday for eight weeks. If the patient is gravely ill, the oral treatment should be preceded by an intramuscular injection of 10 grains of quinine dihydrochloride. In cerebral malaria with deep coma 10 grains of dihydrochloride in ½–1 pint of hypertonic saline (3 per cent.) should be injected very slowly into a vein, and if the patient is still unconscious in 12 hours, this may be repeated, though the outlook in such cases is bad.

Mepacrine [atebrin] may be substituted in doses of 0·1 gm. thrice daily for seven days, followed by 0·2 gm. on Saturdays and Sundays for eight weeks, and preceded, in severe cases, by injections of quinine. At the present time, when it is important to conserve quinine, mepacrine should be used whenever possible ; there is some evidence which suggests that it is a more effective suppressive than quinine. Toxic effects are few with the doses advised. [There is a fairly widespread belief in the general population that the continued use of quinine leads to sterility ; it might be well for medical officers to disabuse the minds of patients, and of persons advised to take prophylactic doses, of this false idea.] *C. W.*

Nicol (W. D.) & Shute (P. G.). **Economy in Quinine.** [Correspondence.]—*Lancet.* 1942. May 2. pp. 545–546.

Economy in the use of quinine is necessary ; the authors give the results of their experience in the treatment of induced malaria or of malaria in persons returned to Britain from an endemic area. The amount of quinine necessary for cure varies according to the species

of parasite ; hence the importance of first establishing a diagnosis. For *P. vivax* a single dose of five grains will abort an attack, and five grains once daily for 15 days will effect a cure of the febrile attack. Larger doses or extended treatment will not prevent relapses, and this applies to patients bitten once by a single infected mosquito or by 100 infected mosquitoes daily for a week. In relapses even smaller quantities will suffice for cure. This experience was gained by the use of more than six strains of *P. vivax*.

P. falciparum infections require 10 grains daily for 10 days, and this dosage is adequate for mixed infections. The so-called anti-relapse treatment is useless. Quinine should not be given after the cure of the first infection until relapse occurs, and then only when diagnosis has been confirmed by blood examination.

[The authors have had great experience ; their method of treatment should be carefully considered in malarious countries.] *C. W.*

PENFOUND (William T.). **The Relation of Plants to Malaria Control. With Special Reference to Impounded Waters.**—*Public Health Rep.* 1942. Feb. 20. Vol. 57. No. 8. pp. 261–268.

This is another contribution to the literature of mosquito control that comes from the Tennessee Valley. Proper reservoir preparation and adequate reservoir maintenance result in lessened need for larvicides. Aquatic plants provide food and shelter for anopheline larvae. The paper gives a summary of plant investigations during the summers of 1937 to 1940.

Some trees withstand flooding ; others do not. A large number of American trees are classified according to their tolerance to flooding. All intolerant species should be removed before impoundment for some distance above the maximum pool level, since dead trees or their parts constitute a mosquito hazard when they fall into the reservoir. Tree stumps produce new shoots. Clearing of a reservoir takes two or three years. Stumps in the marginal area may produce shoots of such a height as to create a mosquito hazard subsequent to the closure of the dam. Observations on the seasonal growth of coppice has enabled the time to be fixed for rebrushing, and thus eliminating this hazard. Willow stump poisoning may be essential ; the technique for this is described ; success has been obtained with arboricides that are but little toxic to men and cattle. Low cutting of stumps is necessary ; coppice does not grow from completely inundated stumps.

Herbaceous plants offer more difficulties ; the life histories of the worst offenders are being studied, and the rates of colonization in relation to fluctuation schedules are being determined. Periodic cutting has given good results with cow-lily and lotus. Herbicides have been useful ; sodium arsenite is effective. Five other substances less toxic to man and domestic animals promise well : an emulsion of sodium arsenite and fuel oil, two fuel oils, and two phenolic compounds. Airplane application of powdered herbicides has opened up vegetation for more effective antilarval measures, and may possibly reduce plant growth sufficiently to obviate the use of larvicides.

Complete clearing to the maximum pool level and a thorough autumn clean-up just preceding wintertime impoundment are essential to effective mosquito control during the first two or three seasons in the life of a reservoir. Rigid control of obnoxious shoreline vegation is almost synonymous with adequate reservoir maintenance. *Norman White.*

Morrison (Dempsie B.) & Anderson (William A. D.). **The Pigment of the Malaria Parasite.**—*Public Health Rep.* 1942. Jan. 16. Vol. 57. No. 3. pp. 90–94. With 2 figs.

A careful investigation of the malarial pigment which is elaborated from the haemoglobin of the red blood corpuscles by *Plasmodium knowlesi* has confirmed the results obtained in a similar investigation of Sinton and Ghosh [this *Bulletin*, 1935, Vol. 32, p. 127] who concluded that the pigment was haematin or ferri-haemic acid, as the authors of the present paper prefer to call it. As did Sinton and Ghosh, the authors found that the pigment can be dissolved without being denatured or altered by 0·5 N sodium carbonate solution. It is identifiable spectrophotometrically as haematin and yields haemin crystals and pyridine haemochromogen by appropriate treatment.

C. M. Wenyon.

Anderson (W. A. D.) & Morrison (Dempsie B.). **Role of Parasite Pigment (Ferrihemic Acid) in the Production of Lesions in Malaria.**—*Arch. Pathology.* 1942. May. Vol. 33. No. 5. pp. 677–686. With 7 figs.

The authors have inoculated solutions of disodium ferrihaemate intravenously into monkeys with a view to comparing the lesions produced with those seen in monkeys which had died of *Plasmodium knowlesi* infections. These are qualitatively similar, the changes noted at autopsy differing mainly in degree. The most significant of these are widespread thromboses in small vessels, degeneration of the renal tubules, with cast formation and deposition of pigment in the reticulo-endothelial cells. It is thought that the mechanism of injury in simian malaria is anoxaemia, due to vascular occlusion, superimposed on the severe anaemia already present. It does not appear that the parasite pigment is a specific toxic factor, as it is not liberated in soluble form from the parasites. [See also this *Bulletin*, 1942, Vol. 39, p. 604.]

C. M. Wenyon.

Ray (J. C.), Mukerjee (S.) & Roy (A. N.). **Agglutination Reaction in Experimental Animals in Response to *Plasmodium knowlesi* Antigen.**—*Ann. Biochem. & Experim. Med.* 1941. Vol. 1. No. 3. pp. 207–218.

The authors have tested the agglutinating properties of the sera of monkeys which have recovered from the acute stage of infections with *Plasmodium knowlesi* as the result of suitable treatment, of such chronically infected monkeys as have been subjected to a number of superinfecting infections of parasites, and of monkeys which have been immunized by the injection of vaccines of killed parasites. The sera were tested, in various dilutions, with freshly prepared antigen, which consisted of infected red cells containing a high percentage of mature parasites in 100 volumes of physiological saline solution. The test was carried out in test tubes as in the standard Kahn test and the result, observed macroscopically, was controlled by microscopic examination. In a positive case there was macroscopic granule formation and microscopic agglutination of the cells containing mature parasites.

It was found that agglutinating antibodies appear in the sera of monkeys after the acute phase of infection has passed. With increase

in duration of the chronic infection there is increase in the titre of the agglutinin. There is a further rise in the titre if superinfection is carried out. Monkeys which have been immunized by injection of antigens of killed parasites will in some cases produce agglutinins in their sera. The agglutinins in immune serum could sometimes be absorbed by infected red blood corpuscles as well as by parasites which had been freed from the cells. *C. M. Wenyon.*

BROOKE (M. M.). **Inoculation of Canaries with Sporozoites from Isolated Malarial Oocysts.**—*Amer. Jl. Hyg.* 1942. Jan. Vol. 35. No. 1. pp. 134–137. [12 refs.]

With a view to obtaining genetically pure strains of malarial parasites attempts were made to infect canaries by the injection of sporozoites from single oöcysts. Two parasites—*P. cathemerium* and *P. relictum*—were employed and seven oöcysts were successfully isolated and washed free of any sporozoites which may have been in the mosquitoes' body cavity fluid. The contents of the oöcysts were inoculated to canaries, six intravenously and one subcutaneously. Though some at least of the oöcysts when ruptured liberated what appeared to be fully developed motile sporozoites no infections occurred. It seems probable that sporozoites are not infective till after they have left the oöcysts.

Previous observers [MISSIROLI, this *Bulletin*, 1938, Vol. 35, p. 104, and NERI] have reported positive results from similar experiments, but it seems possible that in these cases infections resulted from sporozoites in the body cavity fluid. Another factor which may have accounted for the negative results recorded in this paper is insufficiency of sporozoites injected. SHAH has found that a minimum of 200 sporozoites from the salivary glands are required to produce infection in canaries [see this *Bulletin*, 1934, Vol. 31, p. 701]. *C. M. Wenyon.*

VELICK (Sidney F.). **The Respiratory Metabolism of the Malaria Parasite, *P. cathemerium*, during its Developmental Cycle.**—*Amer. Jl. Hyg.* 1942. Jan. Vol. 35. No. 1. pp. 152–161. With 3 figs.

The high synchronicity of the malarial parasite *P. cathemerium* renders it particularly suitable for the study of respiration at different stages of growth, for at any moment the great majority of parasites are at one stage of development. In this paper the author records the results of the measurement of oxygen consumption of suspensions of parasitized red cells in standard Warburg manometers. After making allowances for the oxygen consumption of the nucleated red blood corpuscles of the canary, it was found that the oxygen consumption of the malarial parasites increased slowly during growth but was greatly accelerated when nuclear division commenced. As in the case of *P. knowlesi*, oxygen consumption is completely arrested by cyanide. It seems probable therefore that "the final stages of the biological oxidations in the parasite are catalysed by the cytochrome : cytochrom-oxidase system." This is evidenced by the increasing ability of the parasite to oxidize *p*-phenylene diamine during its development. The paper shows how anti-malarial drugs can be tested in the Warburg manometer by the effect they have on the oxygen consumption of the parasites. Thus, sulphathiazole inhibits oxygen consumption to a much greater degree than sulphanilamide, which is therapeutically less potent than sulphathiazole. *C. M. Wenyon.*

Schulemann (Werner). Zur Weiterentwicklung der Malariasporozoiten im Warmblüter. [**The Further Development of Malaria Sporozoites in Warm Blooded Animals.**]—*Deut. Med. Woch.* 1942. Apr. 10. Vol. 68. No. 15. pp. 374–375.

The author has continued his observations on the behaviour of sporozoites of bird malaria when inoculated into canaries. In the experiments described in this paper salivary glands of *Culex pipiens* containing sporozoites of *Plasmodium cathemerium* were used. The salivary glands were broken up in canary blood serum and the resulting emulsion stained with a dye, *e.g.* trypan violet, which observation has shown to be without injurious effect on the sporozoites and subcutaneous tissues of the bird. The coloured emulsion was inoculated into a layer of fat which lies under the outer border of the pectoralis major muscle of the canary. The colouring matter, which disappears in 24 hours, enables the exact localization of the inoculated material to be followed. The site was excised in 24, 48, 63 and 99 hours, the tissues fixed in sublimate alcohol, embedded and sectioned. The sections were stained with Giemsa or methylene-blue-azure-eosin solution. Large numbers of sporozoites were present in the sections and their development could be followed. There appeared two chromatin masses in the vast majority of the sporozoites. These masses passed to opposite ends of the sporozoite, which finally divided into two uninucleate bodies. These became more rounded, while the nuclear material increased in size. The development of these bodies, which are extracellular, has not yet been followed any further. In addition, certain other forms were seen. One was cylindrical and contained four or more chromatin granules ; other bodies were intracellular and contained a number of nuclei. It would appear that the development, which may take place both intra- and extra-cellularly, is quite irregular. The main result of the present investigation is a clear demonstration that division of the sporozoite into two parts, as first described by Missiroli, actually takes place.

C. M. Wenyon.

TRYPANOSOMIASIS.

Vaucel (M.). État de la maladie du sommeil au Cameroun en 1939. [**Sleeping Sickness in the Cameroons.**]—*Ann. Inst. Pasteur.* 1941. Sept. Vol. 67. No. 3. pp. 189–215. With 3 figs. [21 refs.]

The campaign against sleeping sickness no longer constitutes the main preoccupation of sanitarians in the Cameroons. The number of cases discovered annually has shown a considerable reduction, notwithstanding certain local fluctuations. This paper, which is naturally mainly of local interest, gives a history of the disease since Jamot first began his investigations in 1922 to 1926. The second stage in the campaign lasted from 1926 to 1929, during which time the prophylaxis

missions were put into operation. By the end of 1928, all the infected regions of the Cameroons had been inspected and Jamot classified them as follows :

A.—*Epidemic zones*, with an infection rate greater than 15 per cent. These included Nyong (46 per cent.), Deng-Deng and Bertoua (40 per cent.) and Bertoua (28 per cent.). In these three foci, no fewer than 82,583 persons were infected out of 194,889 examined (43·2 per cent.).

B.—*Endemo-epidemic* zones, with an infection rate sometimes more and sometimes less than 15 per cent. These included Doumé, Nanga-Eboko, Manguissas and Sanaga, Bafia, and Sangmelima. Of the 160,306 persons examined, 23,319 (14·5 per cent.) were infected.

C.—*Endemic zones and zones in transition between contaminated regions and uninfected regions.* In these areas, of 287,257 examined 6,893 (2·4 per cent.) were infected.

Before the creation of the prophylaxis missions, 64,012 patients had been discovered and of these 21,673 (34 per cent.) had died between 1920 and 1926. Among the patients treated, the mortality was 5 to 15 per cent., whilst among the untreated, Jamot concluded that it was 25 to 50 per cent.

The next portion of the report describes the influence of the operations of the missions on the evolution of the disease. The various zones are dealt with in detail one by one in a manner which it is impossible to deal with in a brief summary : those interested must consult the original.

A chart is given, showing the number of new cases discovered each year between 1920 and 1938. From this chart it is easy to see the striking success which followed the campaign introduced in 1927 and 1928 and which led to a fall in the total of new cases from 54,712 in 1928 to 6,000 in 1929. During the 10 years which followed, the number of new cases has remained at about this level. The total result appears to be that chemotherapy, enriched of late years by new products or new combinations, cures most of the patients but does not suffice to cause the disease to disappear. *W. Yorke.*

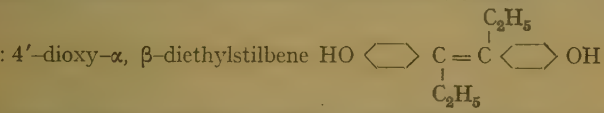
Muraz (G.). Exécution et résultats du nouveau programme anti-sommeilleux en A.O.F. et au Togo (du 1er Avril 1939 au 1er Janvier 1942). [**The Results of a New Sleeping Sickness Programme in A.O.F. and Togo (from 1st April 1939 to 1st January 1942).**— *Presse Méd.* 1942. June 20. Vol. 50. No. 30. pp. 409–410.

This article describes the changes in the sleeping sickness campaign made necessary by the war and by the armistice. Notwithstanding these, however, the work has continued actively, as is shown by the figures set out in several tables. In 1938, for example, the number of people examined was about 1,291,000, whereas in 1940 it had increased to 2,675,000, and in 1941 to 4,414,000. The new infection rate had fallen during this period from 2·11 per cent. in 1938 to 1·08 in 1940 and 0·74 per cent. in 1941.

On 1st January, 1942, the number of cases of sleeping sickness living in A.O.F. and in Togoland is stated to be 235,104 ; of these 39,176 are possibly cured and under observation without treatment, and 71,378 are considered to be definitely cured. *W. Yorke.*

Leipert (Th.) & Loucopoulos (L.). Zur Toxikologie der Stilbene. [**On the Toxicology of Stilbene.**]—*Arch. f. Experim. Path. u. Pharm.* 1941. Nov. 1. Vol. 198. No. 3. pp. 299–304. With 1 fig. [20 refs.]

Loeser and Grumbrecht (1939) observed degenerative changes in the liver of experimental animals after subcutaneous and intramuscular injections of the synthetic oestrogenic compound (Cyren) :—



4 : 4′–dioxy–α, β–diethylstilbene

These changes, which consisted of the appearance of fine drops of fat in the liver cells and in the appearance of miliary and nodular liver cell necrosis, were especially well seen within the first three weeks after small doses ; they disappeared later, even after further administration of the compound and after higher doses, so that apparently the animals had become habituated to the drug. The susceptibility of different animals decreases in the following order : cats, rats, mice, rabbits, guineapigs and dogs. Some later workers found fatty changes in the liver cells of injected animals, and others failed to do so, but nobody succeeded in confirming the necrotic changes described by Loeser and Grumbrecht. Secondary effects of stilbene therapy could not be ascribed to a toxic action of the drug on the liver but might be due to the oily solvent.

Since these findings were entirely based on histological examinations, the authors asked themselves whether corroborative evidence could be obtained chemically through the estimation of the ether-insoluble phenol of the urine by means of the Millon's reaction for the demonstration of liver damage. The normal organism excretes only traces of ether insoluble phenol, which can be related to tyrosin. In necrotic degeneration of the liver cells, there is an increased output of tyrosin, so that in the severest cases (acute yellow atrophy) it appears as tufts of crystals. Such a urine is coloured deep red on warming with Millon's reagent. But this reaction is obviously unsuitable for the present investigation, as the amount of tyrosin excreted as the result of minor liver damage due to stilbene must be small. The authors describe their modified technique for determining whether there is any excess of tyrosin in the urine of rabbits treated with stilbene. Details of the experiments are given, from which the authors conclude that they could find no support for the contention of Loeser and Grumbrecht that the administration of stilbene leads to organic and functional liver injury. *W. Yorke.*

Darman (Muhtar). Multiplication du *Trypanosoma cruzi* dans le sang périphérique de la souris par passages successifs. Recherche de la prémunition vis-à-vis des souches homologues et hétérologues. [**Multiplication of *T. cruzi* in the Peripheral Blood by Successive Passages through Mice. Premunition against Homologous and Heterologous Strains.**]—*Ann. Parasit. Humaine et Comparée.* 1941. Vol. 18. Nos. 4–5–6. pp. 166–179. With 5 graphs.

The author attempted to enhance the virulence in mice of two strains of *T. cruzi*. The first strain (Téhauntépéc) was brought from

Mexico by Brumpt in 1938 ; the second (Vickersae) was obtained from Mayer in Hamburg in 1935. An account is given of the technique employed.

It was found possible by successive passages through mice to produce an increase in the number of trypanosomes occurring in the peripheral blood. With the Téhuantépéc parasite at the end of the 12th passage more than 40 trypanosomes per microscopic field were found, whilst with the Vickersae parasite this degree of blood infection was obtained after six passages. The virulence or pathogenic power of the parasite was not related to the number of flagellates in the peripheral blood ; it depended upon the strain itself. An approximately equal degree of blood infection was obtained with each strain, but the Téhuantépéc trypanosome produced a mortality of 10 per cent. of the infected mice, whereas the mortality produced by the Vickersae parasite was nil. Moreover, the mortality produced by the Téhuantépéc parasite was irregular and not parallel to the number of parasites in the peripheral blood.

Cross immunity experiments showed (1) that mice infected with the Téhuantépéc strain exhibited a marked resistance against reinfection with the same strain four months later ; (2) that the two strains were different ; and (3) that mice reinfected after a month with the Vickersae strain exhibited a more or less marked resistance to this strain.

W. Yorke.

TORREALBA (J. F.). Xénodiagnostics de la maladie de Chagas à Zaraza (Guarico, Venezuela). Vingt cas positifs sur soixante examens. [**Xenodiagnosis in Chagas's Disease at Zaraza (Guarico, Venezuela). Twenty Positive Cases in Sixty Examinations.**]—*Ann. Parasit. Humaine et Comparée.* 1941. Vol. 18. No. 4–5–6. pp. 154–165. [38 refs.]

The first xenodiagnoses undertaken by the author at Zaraza in 1933 gave five positive results in 20 cases ; details are given. Since the publication of these results, Torrealba has continued his work and summaries are given of 17 further positive results.

Discussing the subject of diagnosis in Chagas's disease, the author states that, as the value of the Machado reaction is debatable, as the examination of thick films is of value only in new and recent cases and as blood inoculation fails, he concludes that Brumpt's xenodiagnosis is the method of choice. Torrealba usually employed *Rhodnius prolixus* for this purpose, but sometimes *Eutriatoma maculata.*

W. Yorke.

LEISHMANIASIS.

COLE (A. C. E.), COSGROVE (P. C.) & ROBINSON (G.). **A Preliminary Report of an Outbreak of Kala-Azar in a Battalion of King's African Rifles.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. June 30. Vol. 36. No. 1. pp. 25–34.

This paper describes an outbreak of kala azar in a native battalion which had been operating in Kenya in the vicinity of the northern end of Lake Rudolph. There were in all thirty cases in the battalion and

one in an auxiliary unit. The clinical features of the disease are described in some detail and, as the cases were under observation in hospital from the commencement of illness, these are of considerable interest. It is noted that in some respects the clinical and pathological findings are inconsistent with the usual description of kala azar. Leishmania were discovered in only 22 of the 31 cases, and of these positive cases 14 proved fatal. An account is given of the post mortem findings. Treatment consisted of intravenous injections of tartar emetic, the only antimonial available. Though in every case the temperature fell, the fever usually returned in two or three weeks after the course had been completed. A second course would again bring down the temperature, but the condition of the patient might have deteriorated to such an extent that the drug could no longer be tolerated. Though certain patients had been discharged from hospital the evidence of cure was not very convincing. *C. M. Wenyon.*

STEIN (L.) & WERTHEIMER (E.). **A New Fraction of a Cold-Susceptible Protein in Blood of Dogs Infected with Kala-Azar.**—*Ann. Trop. Med. & Parasit.* 1942. June 30. Vol. 36. Nos. 1 & 2. pp. 17–27. [19 refs.]

The authors noted that serum taken from dogs suffering from kala azar contracted in Haifa Bay or the Plain of Esdraelon in Palestine formed a precipitate if it were kept at 5°C. for some time. Investigation showed that precipitation actually occurred at any temperature below 37°C. but the rate was proportionate to the lowness of the temperature and the concentration of a certain euglobulin fraction in the serum. The precipitate, or at least most of it, redissolved on raising the temperature to 37°C. This redissolvable fraction is termed the cold fraction (C.F.). In addition there is a further euglobulin fraction which is precipitated when serum is diluted. This is called the dilution fraction (D.F.). Another is precipitated by 11 per cent. sodium sulphate. Some of the properties of these various fractions, which are very labile, are described in the paper. It is suggested that investigations with the aid of the ultracentrifuge and Tiselius apparatus will yield further information about the proteins of kala azar serum.
C. M. Wenyon.

SATI (Mohammed Hamad). **Antimony Treatment of Sudan Kala-Azar.**—*Ann. Trop. Med. & Parasit.* 1942. June 30. Vol. 36. Nos. 1 & 2. pp. 1–8.

The author states that during a period of five years he has treated 347 cases of kala azar in the Anglo-Egyptian Sudan with antimony in one form or another, with a death rate of 20·7 per cent. Though he admits that the standard methods of treatment advocated by observers in India have proved inadequate for the disease as it exists in the Sudan, he considers that reports of the failure of antimony treatment give too gloomy a picture. Basing his conclusions on a series of 150 cases which were admitted to the Singa Hospital, he finds that a combination of drugs gives a better result than a single one. The drugs employed were tartar emetic and neostibosan, solustibosan and neostam. Of these tartar emetic appeared to be the most potent but it was the most toxic. A full course of neostibosan or solustibosan was followed after a week's interval by a course of tartar emetic and again a week later,

if necessary, by a further course of one of the pentavalent compounds. The author does not favour the practice of commencing a course with small doses. A better response is obtained by giving large doses from the beginning. Emphasis is laid on early diagnosis and the institution of antimony treatment as soon as possible. Gland puncture has greatly facilitated discovery of parasites, as there is less reluctance to undertake this than spleen puncture, though the author states that he has carried out the latter operation over 2,000 times without having a single fatality. The cases, in which the ages varied from 17 months to 60 years, are analysed in a series of tables. *C. M. Wenyon.*

NAPIER (L. Everard) & GUPTA (P. C. Sen). **A Peculiar Neurological Sequel to Administration of 4 : 4′-Diamidino-Diphenyl-Ethylene (M. & B. 744).**—*Indian Med. Gaz.* 1942. Feb. Vol. 77. No. 2. pp. 71–74. With 1 fig.

The authors state that their experience of the treatment of kala azar in Calcutta with 4 : 4′-diamidino-diphenyl-ethylene is based on 98 cases, a report upon which is in course of preparation. In this paper attention is called to a peculiar neurological condition which developed in four patients a few months after a course of treatment with this drug.

It is noted in the first place that an almost constant finding during and immediately after the first few intravenous injections is a marked fall in both systolic and diastolic blood pressure. Usually the pressure rises nearly to the previous level within 5 to 10 minutes, when unpleasant symptoms such as burning sensations, flushing of the face, transient difficulty in breathing, nausea, vomiting, epigastric distress, giddiness, palpitation, sweating or collapse, disappear. When rise in blood pressure is delayed, injections of adrenalin raise it almost immediately.

In the four cases referred to there developed anaesthesia to light touch over the trigeminal area, with preservation of sensation of pain, temperature and pressure. This appears to be due to a lesion in the pons involving the principal sensory nucleus of the trigeminal nerve. The condition, which is not progressive, shows a tendency to spontaneous cure. *C. M. Wenyon.*

ADLER (S.) & TCHERNOMORETZ (I.). **The Action of Some Aromatic Diamidines on Infections of** *Leishmania donovani* **in the Syrian Hamster** *Cricetus auratus.*—*Ann. Trop. Med. & Parasit.* 1942. June 30. Vol. 36. Nos. 1 & 2. pp. 11–16.

In a previous paper [this *Bulletin*, 1942, Vol. 39, p. 173] the authors gave an account of experiments in which they showed that 4 : 4′-diamidino-stilbene (stilbamidine) was therapeutically effective in the treatment of Syrian hamsters infected with *Leishmania donovani* or *L. infantum*. In the present paper are recorded experiments with other aromatic diamidines on hamsters infected with *L. donovani*.

These were 4 : 4′ diamidino diphenyl ether (phenamidine)
4 : 4′ diamidino phenyl benzyl ether
4 : 4′ diamidino diphenyl ethane
4 : 4′ diamidino diphenoxy ethane
4 : 4′ diamidino diphenoxy pentane (pentamidine)
4 : 4′ diamidino diphenoxy propane (propamidine).

One of these compounds, the last in the above list, was very effective, being equal in activity in the case of light infections to stilbamidine but less so in the case of heavy ones. *C. M. Wenyon.*

Humphreys (R. M.). **Two Cases of Oral Pharyngeal Leishmaniasis treated with Pentamidine.**—*Ann. Trop. Med. & Parasit.* 1942. June 30. Vol. 36. Nos. 1 & 2. pp. 9–11. With 2 figs. on 1 plate.

Two cases of oro-pharyngeal leishmaniasis were admitted to the Khartoum Hospital. In both there was extensive involvement of the mucous membrane of the mouth, pharynx and fauces. One of the patients had been cured over three years before by a course of tartar emetic injections but had relapsed. Both were now treated by intravenous injections of pentamidine (4 : 4′-diamidino diphenoxy pentane), one receiving a total of 7,700 mgm. and the other 8,500 mgm. in 66 and 72 injections respectively, spread over about three months. One patient improved considerably and then left hospital. His death from an unknown cause was reported later. About eight months after the completion of the treatment the second patient appeared to have completely recovered. *C. M. Wenyon.*

Dwork (Kermit G.). **Cutaneous Leishmaniasis (Oriental Sore) in the United States and Canada. A Survey of the Literature and Report of Four Cases.**—*Arch. Dermat. & Syph.* 1942. Apr. Vol. 45. No. 4. pp. 676–684. [Refs. in footnotes.]

The author has collected from the literature records of 24 cases of oriental sore in the United States and Canada. To this total he adds four cases not hitherto described. In all but one of these 28 cases the infection was acquired in the Near Eastern region or other districts of the Old World where the disease is known to be endemic. The other case, which was of S. American origin, may not have been one of true oriental sore. *C. M. Wenyon.*

Dostrovsky (A.) & Sagher (F.). **Treatment of Cutaneous Leishmaniasis (Oriental Sore) by Grenz Rays.**—*Arch. Dermat. & Syph.* 1942. May. Vol. 45. No. 5. pp. 865–875. With 4 figs.

The paper gives the results of treatment of oriental sore in Palestine by exposure to infra-roentgen rays (grenz rays or Bucky rays). Seventy-two cases of ulcerating or nodular oriental sore and twelve cases of the chronic relapsing tuberculoid type were observed. In a number of cases in which multiple lesions were present only certain lesions were treated, the others in the same case being left as controls. It was found that in the nodular and ulcerating forms the treated lesions healed in eight to ten weeks, while any untreated lesions continued to develop, and finally healed after some months as in untreated cases of oriental sore. It was evident that the healing, by exposure to rays, of some lesions in a case did not influence the course of any untreated lesions. As regards the relapsing type of cutaneous leishmaniasis, which may be of many years' duration and which is most intractable, exposure to grenz rays has brought about cure in a number of cases in six to eight months, a result which is most encouraging, for hitherto no form of treatment has influenced the condition. For the

simple type the dose employed was two exposures of 800 r with a half value layer of 0·027 mm. of aluminium, while for the chronic relapsing form it was 3,000 to 11,000 r with a half value layer of 0·02 mm. of aluminium. The paper is illustrated by a number of photographs showing the results of infra-roentgen ray treatment and the good effects as regards subsequent scarring and pigmentation.

C. M. Wenyon.

KATZENELLENBOGEN (I.). **Vaccination against Jericho Boil.**—*Ann. Trop. Med. & Parasit.* 1942. June 30. Vol. 36. Nos. 1 & 2. pp. 28–31.

As oriental sore was becoming very common amongst workers of the Palestine Potash Plant on the Dead Sea, where in one year 90 out of 120 new settlers had become infected, it was decided to try experimental inoculation on the thigh as a measure of prophylaxis. Accordingly 167 persons were inoculated intradermally either with flagellates from cultures or with leishmania from the spleens of previously infected hamsters. In 135 a sore developed at the site of inoculation after incubation periods of less than a fortnight to two months. In most of the negative cases there was a history of a previous infection or of several years' residence in the area. In five cases with signs of previous infection the inoculation was followed by an acute inflammatory reaction with tenderness of the inguinal glands and elevation of temperature to 39°C. In these no local lesion developed. In four other cases, however, which gave the inflammatory reaction without there being any history of an earlier infection, a sore developed. Three persons who had recovered from a previous infection gave no reaction. One who was known to have suffered from oriental sore five years before developed a sore at the site of inoculation on the thigh. Leishmania were found in the lesions of the early infection in 1936 and again in the later one in 1941. This case is the only one in which the authors have seen re-infection, in an experience of 17 years. During 1941 over 100 cases of oriental sore occurred amongst unvaccinated persons but none occurred amongst those who had received the prophylactic inoculation.

C. M. Wenyon.

FEVERS OF THE TYPHUS GROUP.

GEAR (James) & DAVIS (D. H. S.). **The Susceptibility of the South African Gerbils (Genus *Tatera*) to Rickettsial Diseases and their Use in the Preparation of Anti-Typhus Vaccine.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. June 30. Vol. 36. No. 1. pp. 1–7. With 2 figs. on 1 plate.

The two common gerbils of South Africa, *Tatera brantsi* and *T. afra*, were found to be susceptible to all the three forms of typhus fevers which occur in that country, *viz.* louse-borne, flea-borne and tick-borne typhus. After exposure of the animals to X-rays and intraperitoneal inoculation with the virus of each of these diseases profuse Rickettsial growth was found in the peritoneum. The source of the infecting

material was the brain of infected guineapigs except in the case of the tick-borne disease in which it came from the peritoneal exudate of an infected white rat.

Gerbils are claimed to be the animals of choice for obtaining large amounts of Rickettsiae in all three diseases; similar inoculations in other animals have not been found capable of yielding such a rich supply. Gerbils do not breed readily in captivity but are obtainable in large numbers in South Africa where a systematic campaign of extermination is being carried out because the animals are the chief rodent reservoir of plague in that country. They are widely distributed throughout Africa and extend through Arabia and Asia Minor as far as India. *John W. D. Megaw.*

Owczarewicz (Leon). W sprawie epidemiologji duru plamistego w Polsce i Rosji. [**Typhus Exanthematicus—Louse-borne Epidemic Typhus.**]—*Lekarz Wojskowy* (*Jl. Polish Army Med. Corps*). 1942. June–July. Vol. 34. No. 4. pp. 204–208, 211–12, 214–20. English summary pp. 220–222.

This article appears in the fourth number of the 34th volume of the *Journal of the Polish Army Medical Corps*, now published in England. The Corps is to be congratulated on this evidence of its vigour and enterprise.

The author served in the last war as epidemiologist with the Russian Army and so can discuss the epidemiology of the disease in the light of his own great experience.

The home of typhus is Eastern Poland, Russia, and the Balkans. A good example of the persistence of infection in places apparently free from the disease is given: a Russian regiment was billeted in peasant huts in East Poland during the last war and although no sign of the existence of typhus in the locality was detected, cases soon began to appear, as many as a hundred fresh cases were admitted daily. Transfer of the regiment to barracks, and delousing, controlled the epidemic within a few days. Persons immunized to the disease by previous attacks can still play a part in spreading infection by transferring lice from infected persons. The original source of infection may be impossible of detection, hence the suggestion has been made that rats infected with flea-borne typhus may sometimes be responsible, but although infected rats have been found in Poland the author doubts whether rats can serve as reservoirs of infection. Dust containing dried faeces of infected lice cannot play an important part during epidemics. The mildness of the disease in children is well shown by the statistics of Leningrad hospitals in 1918–19; the average case mortality was 9·2 per cent. for all ages; for children it was 0·6 per cent. The mortality is specially high in doctors and nurses, and in brain workers. The relative immunity of motorized units is attributed to the use of petrol.

Effective delousing is very difficult in field conditions, so that efforts have been made to prevent infestation by various means. Impregnating the clothing with cresol preparations only postpones infestation. Lice prefer light-coloured clothes and avoid dark ones, "hence the khaki colour of army clothes." Bags containing various drugs have been sewn into the clothes; the Russians used a "malinin" solution consisting of a mixture of turpentine, an oil extract of Persian powder, phenol and cinnamon oil; this was quite effective against lice and

even more so against bugs. A mixture of " oil " [presumably kerosene] and turpentine acted as well as a mixture of " oil " and xylol. A mixture of " oil " and petrol sprayed on the clothes of the medical staff was used by the author with good effect. Best of all is a mixture of petrol, xylol and " oil " to which a few drops of turpentine can be added to remove the smell. Mention is made of the British Army N.C.I. powder, which is a mixture of 96 parts crude naphthalene and two parts each of creosote and iodoform ; this is dusted on the underclothes every three days.

The head louse is thought by some to be an effective vector, others [including the German official experts] regard it as quite unimportant. A typhus epidemic is very likely to occur during and after this war.

It can only be prevented by disinfestation, a very difficult proceeding, and immunization, which is not " perfectly safe and sure " for ill-nourished persons. If this war ends in the cold season a great pandemic is likely to occur in Europe, like the one that broke out after Napoleon's return from Moscow. *John W. D. Megaw.*

VACCARO (Hugo) & PERFETTI (Arturo). Reacciones de aglutinación con Proteus XK, X_2, X_{19} en la población de Valparaiso. [**Agglutination Reactions with *Proteus XK*, *X2* and *X19* in the Population of Valparaiso.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1942. Mar. Vol. 4. No. 4. pp. 355–379. [45 refs.]

The tests were made in 559 persons from various hospital services in Valparaiso where typhus fever had been occurring to a varying extent since 1930 : the case mortality rate had ranged from about 8 to 20 per cent. Presumably O strains of Proteus were used.

The results are summarized in the table which has been compiled from the information contained in the paper. Altogether there were 116 (20·8 per cent.) positive responses to one or more strains in dilutions of 1–20 or more.

	Reactions in titres of 1–20 or more	*Reactions in titres of 1–180 or more*		
Positive to *Pr. XK* only	0	0		
Pr. X2	56	43		
Pr. X19	20	3		
		XK	*X2*	*X19*
Positive to *XK* and *X2*	18	10	9	—
XK and *X19*	2	2	—	2
X2 and *X19*	8	—	6	1
XK, X2 and *X19*	12	8	11	7

As none of the sera reacted to *XK* only, the reactions to this organism were regarded as being due to coagglutinins. The combined reactions to *XK* and *X2* were nine times as frequent as those to *XK* and *X19*. The reactions to *X2*, especially in high dilutions, were much more frequent than those to *X19*. With regard to this remarkable finding the authors observe that in Santiago [115 miles away and at an altitude of about 1,800 feet] they found numerous positives to *X19* in titres of 1–80 and not a single positive to *X2*—" an obvious difference." The responses in the present series to *X19* are what would be expected in view of the existence of typhus fever in the area, but " the significance of the reactions to *X2* and *XK* does not appear to be easy to interpret."

The responses of patients suffering from tuberculosis, syphilis and several other diseases did not differ appreciably from those of other

persons. There were six cases of typhus fever in the series: one of these reacted to *X2* and *X19*, two to *XK* and *X19*, three to *XK*, *X2* and *X19*.

Sera of 27 pregnant women were examined: six were positive and the foetal blood gave practically the same responses as the maternal.

Sera of 16 rabbits were tested: all were negative.

Sera of 22 mice yielded 14 positives: 12 to *XK*, 1–40; one to *XK*, 1–160, and one to *X19*, 1–40.

The Proteus strains were obtained from the Bacteriological Institute of Buenos Aires, and the preliminary tests at titres of 1–20 were made by the rapid method, now widely used in Chile, in which stained Proteus suspensions are employed.

[This paper well illustrates the difficulties experienced by many workers in the interpretation of agglutination responses with the various strains of Proteus organisms.] *John W. D. Megaw.*

GIROUD (Paul) & PANTHIER (René). Adaptation directe au poumon de souris d'une souche de typhus historique isolée et conservée sur cobaye. Comportement des rickettsies au cours de cette expérimentation. [**Direct Adaptation to Mouse-Lung Cultures of a Strain of Historic Typhus Isolated and Maintained in the Guineapig. The Behaviour of the Rickettsiae in these Experiments.**]—*Ann. Inst. Pasteur*. 1942. Feb. Vol. 68. No. 2. pp. 137–152. With 2 plates & 1 fig. [Refs. in footnotes.]

Although the authors begin by contrasting the orchitic and non-orchitic strains of Rickettsia they mention in a footnote that they have seen pronounced scrotal reactions in guineapigs inoculated with the blood of persons suffering from historic European typhus, but that these reactions occur only at the first passage.

In the present series of experiments, which were designed to obtain a rich protective antigen against louse-borne typhus, fragments of lungs of infected monkeys and guineapigs were triturated and injected, or were treated by fractional centrifugation and then inoculated, into mice by the nasal route; hepatization of the lungs was produced and Rickettsiae were recovered. But most of the experiments were made with the vaginal exudate of guineapigs infected with louse-borne typhus, a procedure which had already been found successful with the viruses of Rocky Mountain and boutonneuse fevers. The well-known Tunis Rabat strain of NICOLLE was used: a suspension of infected guineapig brain inoculated by the intraperitoneal route usually produced a slight exudate in the tunica vaginalis of male guineapigs, but, exceptionally, periorchitis with abundant exudate containing Rickettsiae occurred naturally at certain seasons. This periorchitis could also be provoked by repeated intraperitoneal injections into the animals of such substances as orchitic extract. With a naturally produced exudate rich in Rickettsiae used for the intranasal inoculation of mice, pulmonary symptoms were caused and by the third passage through the lungs of the mice a very abundant supply of Rickettsiae was secured. With an exudate resulting from artificial stimulation the results were less striking and relatively few Rickettsiae were found in the lungs of mice at the third passage.

Fresh suspensions made from heavily infected mouse lungs were tested by intraperitoneal injection into guineapigs; they caused an immediate severe reaction which was often fatal. Periorchitis was

observed by the fourth day and animals killed on the sixth day had an abundant exudate in the tunica vaginalis containing numerous Rickettsiae. This exudate caused a severe pulmonary reaction in mice inoculated by the nasal route. After repeated intraperitoneal passage of this strain through guineapigs its virulence became attenuated and the scrotal reaction ceased to occur. The highly virulent exudate also became attenuated by prolonged storage in the dry condition or by prolonged refrigeration and then caused only the normal reaction in guineapigs. The virulence of suspensions could be approximately estimated by the intensity of the intradermal reaction in rabbits or by the severity of the reaction in inoculated guineapigs. Guineapigs were vaccinated with formolized suspensions of the lungs of heavily infected mice ; the resultant immunity was equal to that obtained by vaccination with a strain originating from infected lice. Vaccine was also prepared by the intranasal inoculation of rabbits with suspensions made from the lungs of infected mice : formolized suspensions made from the consolidated lungs of the rabbits protected guineapigs, but only if the lungs were found to contain Rickettsiae.

The second part of the paper deals with the various morphological appearances observed in smears of infected material. The authors do not believe that the Rickettsial bodies pass through a true cycle of evolution ; they regard the different forms assumed by the organism as being correlated with its degree of virulence and with the resistance of the infected animals. In smears of infected material they found the following forms : (1) Bacilliform Rickettsiae, (2) Ruby-red granular bodies of 1 to 5μ in size made up of agglomerations of Rickettsiae, (3) Ruby-red homogeneous bodies of 1 to 2μ in size, contained in the infected cells and analogous to the bodies seen after anticholera serum mixed with cholera vibrios has been injected into the peritoneal cavity of guineapigs, (4) Rose-red inclusions and, (5) Red or blue minute granules of about $\frac{1}{10}\mu$ in size.

The bacilliform Rickettsiae are regarded as the only strongly virulent form ; they are always found, together with the ruby-red and rose-red bodies, in highly infective material. In material of low virulence or in animals with high resisting powers bacilliform Rickettsiae are few or absent ; suspensions made from such materials have little or no immunizing power. Material free from bacilliform Rickettsiae is, however, capable of causing infection in susceptible animals, and after a number of passages the virulence of the virus is restored and Rickettsiae of the bacilliform type reappear.

Photomicrographs of these bodies and a photograph showing the various degrees of intradermal reaction in the rabbit add to the value of this important paper. *John W. D. Megaw.*

Jacobi & Dörschel. Zur Differentialdiagnose des beginnenden Fleckfiebers. [**The Early Differential Diagnosis of Typhus Fever.**] —*Muench. Med. Woch.* 1942. June 5. Vol. 89. No. 23. pp. 507–509.

This paper is based on observations made on 108 proved cases of typhus fever seen in a hospital " in the East."

The Weil-Felix reaction in titres of 1–200 and upwards was regarded as diagnostic. Positive results were nearly always obtained after five days, sometimes even after three days. The dry-blood agglutination test of Kudicke and Steuer is regarded as being equal to the standard

test [see this *Bulletin*, 1942, Vol. 39, pp. 372–374]. The incubation period rarely exceeded 12 days. Relative bradycardia with low blood pressure (95 to 105 mm. systolic) occurred in 75 per cent. of the cases within the first three days. In 70 per cent. the skin eruption was preceded by a rash on the soft palate, which closely resembled that seen in measles. Conjunctival injection was noticed in 75 per cent. There was meningismus in 25 per cent. On lumbar puncture the pressure was found to be only slightly raised, the cell count was not increased and the albumen was very little more than normal. Bronchitis occurred in 80 per cent. of the cases. There was vasomotor paresis in 75 per cent. within the first three days. The spleen was palpable in 75 per cent. Diarrhoea occurred in five cases, all of which were exceptionally mild, in contrast with the cases in which there was constipation, which were usually severe. True nephritis occurred in three cases.

The rash appeared suddenly between the third and the seventh days; it was nearly always preceded by a mottling of the skin. Pale-blue spots were first noticed, these were never papular as in typhoid.

Differential diagnosis at the onset was often difficult, especially from influenza, though a gradually rising leucocyte count was very suggestive of typhus. Lumbar puncture was often needed to differentiate the disease from cerebrospinal meningitis in the early stages. The other diseases from which early differential diagnosis was sometimes difficult were pneumonia, typhoid fever, measles, epidemic encephalitis and trench fever. A few ambulatory cases were seen; in one there was fever which lasted only four days.

John W. D. Megaw.

Dietrich (A.). Fleckfieberdiagnose durch Untersuchung der Roseolen. [**Diagnosis of Typhus by Means of Histological Examination of the Rash Areas.**]—*Muench. Med. Woch.* 1942. May 1. Vol. 89. No. 18. p. 395.

Liebau (Gerhart). Einige Beobachtungen zur Klinik des Fleckfiebers. [**A Report on Clinical Observations in Typhus Fever.**]—*Klin. Woch.* 1942. May 30. Vol. 21. No. 22. pp. 500–502.

The most important feature of this paper is that it suggests the possibility of conveyance of infection through contact with infected blood smears. The name "blood-smear infection" is proposed.

In November 1941 no less than 23 healthy German soldiers were attacked with typhus fever; they belonged to a squad of 25 men engaged in looking after typhus patients in a Russian prisoner-of-war camp near Berlin. The soldiers were treated in a military hospital in which the strictest precautions were observed; these included preliminary delousing, bathing and change of clothing. There were no further cases among the attendants on the soldiers with the remarkable exception of the medical officer in charge. In his case infection through the bites or infected faeces of lice could be excluded in the conditions prevailing in the hospital. The most obvious explanation of his infection was contact with blood smears of the patients from whom he took numerous specimens of blood and to whom he gave transfusions. To the best of the author's knowledge this is the first time that blood-smear infection has been recognized.

Some of the clinical features of the 23 cases were as follows :—

There were two deaths, one from myocarditis and one from secondary staphylococcus infection. The incubation period was only five days in one case. The haemoglobin content of the blood was reduced by 35 to 40 per cent. in most of the cases and full restoration took two to four months. Circulatory disturbances were observed in all but one of the cases, and the risk of heart failure till a late period of convalescence is emphasized. In 11 cases there was partial deafness lasting three to four weeks. Sulphonamide drugs were without obvious effect except in cases of secondary infection such as bronchopneumonia, in which sulphapyridine was useful. During the first week baths at 37° to 40°C. were given once or twice daily for periods of a few minutes up to an hour. Adrenal cortical substances had no effect in cases with low systolic pressures. Subcutaneous injections of normal saline were helpful in cases of painful dryness of the throat, tongue and lips ; up to 1,000 cc. were given daily. Chloral hydrate in doses of one to three grammes was the best drug for relieving headache, joint pains, restlessness and insomnia. Lumbar puncture also gave relief in such cases. For anaemia iron and campolon were given. A Weil-Felix titre of 1–200 or perhaps even 1–400 does not always establish the diagnosis of typhus fever : a reaction in the latter titre was observed in a healthy attendant on the patients. *John W. D. Megaw.*

Hughes (William) & Baldwin (R. B. T.). **Endemic Typhus in Southern Nigeria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. June 30. Vol. 36. No. 1. pp. 35–39. With 2 charts.

Two cases of fever regarded as " endemic typhus, probably flea-borne," are described as occurring in Lagos. The duration of the fever was about 21 days in one case and about 17 days in the other.

The maximum titres of the agglutination tests in one case were : *Proteus OX19*, 1–1,280 (trace), *Pr. OX2*, 1–160 and *Pr. OXK*, 1–40, all on the 23rd day ; in the other case they were : *Pr. OX19*, 1–1,280, *Pr. OX2*, 1–160 and *Pr. OXK*, 1–80, all on the 10th day. No rash was seen but the patients were very dark-skinned. There was a close clinical resemblance between these cases and some cases of " urban " typhus seen by one of the authors in Malaya. The place of origin of the disease, the absence of a primary eschar and the high *X19* agglutination suggested a flea-borne or louse-borne infection rather than a tick-borne or mite-borne disease and the authors state that the cases described leave little doubt that endemic typhus exists in Nigeria.

Reference is made in the paper to previously recorded cases from North Nigeria which are regarded as being of the same type : (*a*) Two similar cases in Europeans in which a positive Weil-Felix reaction occurred during or after attacks of fever of 14 days' duration with a maculo-papular rash ; these were reported by J. Naudi and T. H. Davey in 1938 ; (*b*) Eighteen cases of a " twelve days fever of the dengue group " reported by L. V. Davies and W. B. Johnson in 1921. Fifteen of these cases were in Europeans and three in Africans ; the fever lasted 10 to 13 days, falling by lysis, and there was a maculo-papular rash. The present authors point out that the features of this group of cases suggest typhus fever rather than dengue.

[The reference to the cases reported by Davies and Johnson is of special interest to the reviewer who in the *Indian Medical Gazette* of October 1921 commented on them in a note written as a supplement to the article in which he first suggested that the various typhus-like fevers should be regarded as " fevers of the typhus group " and should be classified provisionally as louse typhus, tick typhus and mite typhus. In this note it was pointed out that the Nigerian cases resembled the Indian tick typhus rather than dengue. At that time the existence of flea-borne typhus was not known, and although on the evidence the cases described in the present paper seem likely to be flea-borne, the possibility that they and the other fevers referred to by the authors may have been tick-borne has not been excluded.]

John W. D. Megaw.

NEITZ (W. O.), ALEXANDER (R. A.) & MASON (J. H.). **The Transmission of Tick-Bite Fever by the Dog Tick** *Rhipicephalus sanguineus*, **Labr.**—*Onderstepoort Jl. Vet. Sci. & Animal Industry.* 1941. Jan. & Apr. Vol. 16. Nos. 1 & 2. pp. 9–17. [13 refs.]

The virus of tick-bite fever [tick-borne typhus] has been transmitted by *R. sanguineus* from guineapig to guineapig. Larvae bred from infected ticks have also been shown to be able to transmit infection to guineapigs by their bites.

The authors state that, as has already been shown by two of them [Mason and Alexander, this *Bulletin*, 1941, Vol. 38, p. 203], very little experimental work has been done to identify the vectors of tick-bite fever. Most of the evidence has been either circumstantial or has been based on the effects of the intraperitoneal injection of emulsified ticks into guineapigs ; such experiments do not prove that the ticks are natural transmitters of infection.

The authors in 1939 isolated a strain of Rickettsia by feeding nymphs of *Hyalomma aegyptium*, collected from a hare, on a guineapig ; the larvae and adult ticks of the next generation were not infective. GEAR and DE MEILLON in 1939 [this *Bulletin*, 1940, Vol. 37, p. 263] established a strain of Rickettsia in *Haemaphysalis leachi* found on a dog belonging to a patient suffering from tick-bite fever. No other positive results are known in tick-feeding experiments.

The strain of Rickettsia used in the present experiments was maintained with difficulty in guineapigs by brain to peritoneum passage, but rich egg-membrane cultures inoculated into animals by the intraperitoneal route caused pronounced reactions. Clean larval, nymphal and adult *R. sanguineus* were fed on reacting guineapigs and afterwards used to infect other guineapigs by biting. Positive transmission was proved by the demonstration of Rickettsiae in smears from the tunica vaginalis and the production of a pronounced reaction on passage or the development of solid immunity in the inoculated guineapig.

With *R. sanguineus* the following results were obtained : (1) Larvae which had fed on two reacting guineapigs transmitted the infection when fed as nymphs on susceptible guineapigs. (2) Nymph ticks picked up infection which was afterwards transmitted to guineapigs by the ticks when they had grown to the adult stage. (3) Larvae hatched from eggs laid by the infected adults were shown to be infective.

John W. D. Megaw.

Jacobi (J.). Neue Beobachtungen ueber Fünftagefieber mit besonderer Berücksichtigung der Differentialdiagnose und Therapie. [**New Observations on Five-Day Fever (Trench-Fever) with Special Reference to Differential Diagnosis and Treatment.**]—*Muench. Med. Woch.* 1942. July 10. Vol. 89. No. 28. pp. 615–618.

This paper deserves close attention : it shows that trench fever, given suitable conditions, can again become a very important war disease. To the younger generation of medical men trench fever is history but its potentialities can be judged from the fact that about half a million cases occurred among the opposing armies in the 1914–18 war and from the estimate that the fighting strength of the allied armies suffered to the extent of eight million man-power days.

Trench fever is caused by *Rickettsia quintana* which is conveyed from man to man by lice : the organism takes four or five days to develop in the vector. The onset is sudden with chill, headache, pains in the muscles and bones, especially in the shin bones. The fever is of a relapsing type, the spleen is enlarged, the pulse rapid, and there is leucocytosis during the spells of fever. Three types of fever are recognized : (1) Paroxysms of fever lasting one or two days and recurring at intervals of four to six days ; the intermissions usually last about five days. The onset of the successive spells of fever may be anticipated or postponed in the same way as in malaria. There may be anything up to several dozens of paroxysms of fever. (2) The fever may be of an undulating type, the waves recurring with a periodicity of four to ten days. (3) Rarely the fever may simulate typhoid.

The author saw 71 undoubted cases between January and March, 1942 in a " hospital in the East." The diagnosis was made only in cases with relapses of the " five-day type " or with spontaneously mentioned shin-bone pains. There must have been a considerable number of unrecognized cases because of there being no laboratory test for the disease.

Of the 71 cases, 53 had typical shin-bone pains ; these also occur in relapsing fever, tularaemia and the later stages of trench nephritis. There were pains in other parts of the body, especially the knee- and ankle-joints, in 68 cases. The shin-bone pains started during the first spell of fever in 28 cases, during the second in 15, and during the third in 11. The pains were worse during the febrile periods in 28 cases, unaffected by the fever in 26, and less during the fever in three. The fever was paroxysmal in 24 cases, undulating in 34, alternately paroxysmal and undulating in nine and typhoid-like in four. The spleen was always enlarged, the leucocyte count was 10,000–14,000 during the paroxysms, but normal during the intermissions. In six cases a maculo-papular rash was seen during a febrile period ; in one of these cases it appeared on two occasions. In 22 cases the disease occurred as a complication of epidemic hepatitis [acute infective hepatitis caused probably by a filterable virus] of which no less than 450 cases had been seen by the author up to the time of writing. The complications were : acute catarrh of the throat, (6) ; nephritis, (6) ; cystitis, (2) ; pneumonia, (1) ; gastric or intestinal catarrh, (4) ; bronchitis, (2) ; influenza, (3). There were no deaths, indeed there is no record of fatality ever having occurred in uncomplicated cases of the disease.

Pyramidon was given to 48 patients in daily doses of 1·2 to 3·0 grammes : only nine of the patients failed to get decided relief from the pains, but though the drug often seemed to control the fever no

claim is made that it had any curative action. In view of the claim made by MAGERL that four cases of trench fever had been cured by intravenous injections of sulphapyridine this drug was tried in 10 undoubted cases; in four it was given by the vein and in six by the mouth. No benefit was observed; on the contrary, headache, lassitude and vomiting often resulted to such a degree that the drug had to be discontinued.

Differential diagnosis from undulant fever of the *abortus* type may sometimes be impossible without agglutination tests; from typhoid fever in inoculated persons it may have to rest on the leucocytosis and shin-bone pains, because the type of the fever curve and the laboratory tests sometimes fail to provide evidence on which the diseases can be distinguished from each other.

[This is the first, and so far the only, report of a large-scale outbreak of trench fever since 1918. The clinical account of the disease is admittedly incomplete; a number of atypical cases must have been missed because of the lack of a specific laboratory test. Yolk-sac cultures of the Rickettsiae may possibly supply suspensions by which agglutination reactions can be carried out.

The author (presumably for military reasons) has maintained complete silence about the epidemiological conditions in which the outbreak occurred, but there is some significance in his statement that he has seen 450 cases of infective hepatitis and 128 of trench nephritis up to the time of writing.

The failure of sulphapyridine in treatment is an important observation. MAGERL's claim to have cured four cases of trench fever by this drug has already been criticized by the reviewer (see this *Bulletin*, 1942, Vol. 39, p. 154). The author is equally critical of Magerl's diagnosis, and the absence of response to sulphapyridine in a number of undoubted cases of trench fever seems to prove that the n n-malarial quartan fever must have been a different disease. PRIEST (above, p. 738) has just published a note on a case of "Meningococcal Septicaemia Resembling Malaria" which was strikingly similar in all respects to the case described in detail by Magerl; the response to sulphapyridine was equally prompt in both cases. Priest was unable to recover meningococci from the blood but his diagnosis has received anticipatory support which is worth recording. This was contained in a personal communication conveyed to the reviewer some weeks before the appearance of Priest's note. In this D. G. ARDLEY suggested that Magerl's cases might have been meningococcal septicaemia. Whatever this disease may prove to be, one point has been clearly established; there is a non-malarial fever with quartan periodicity which yields promptly to sulphapyridine. For other recent records of disease diagnosed as Trench fever, see this *Bulletin*, 1942, Vol. 39, p. 386.] *John W. D. Megaw.*

YELLOW FEVER.

MAHAFFY (A. F.), SMITHBURN (K. C.), JACOBS (H. R.) & GILLETT (J. D.). **Yellow Fever in Western Uganda.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. June 30. Vol. 36. No. 1. pp. 9–20. With 1 map.

Studies of the distribution of yellow fever immunity in Western Uganda based on investigations extending over 4 years from 1937 to 1941.

These have revealed an important focus of the disease in that part of the Semliki river west of the Ruwenzori Mountains. In Bundibugyo in 1937, the blood of 25 out of 54 adult residents was found to give a positive protection test. The results of earlier tests showed that throughout the area the highest percentage of immune individuals was found in villages along the edge of an uninhabited heavy forest between Hakitengya and Butoga.

A group of 275 individuals from the Bwamba area had been shown to be non-immune in October 1939, or in January 1940 ; some of these were re-examined, and out of 97 tested in April and 71 in June, 1941, 48 had become positive. Further studies resulted in two cases being seen in which a clinical diagnosis of yellow fever seemed justified and a strain of virus was isolated from one of them, an African female, aged 27 years.

In addition two strains were isolated from wild-caught mosquitoes, *Aëdes simpsoni*. This is by far the most prevalent mosquito and comprised 97 per cent. of all mosquitoes captured. It breeds chiefly in plant axils, and although not found inside houses, occurs in their vicinity. *Aëdes aegypti* is very rare, and all the available evidence indicates that this outbreak in Bwamba is associated with contact with the forest. *E. Hindle.*

Bablet (J.). La recherche du test de protection de la souris et l'examen histologique du foie envisagés comme indicateurs dans l'épidémiologie de la fièvre jaune. [**A Study of the Mouse Protection Test and the Histological Examination of the Liver Considered as Indicators in Yellow Fever Epidemiology.**]—*Ann. Inst. Pasteur.* 1941. Apr. Vol. 66. No. 4. pp. 320–328. With 1 fig. (map).

A record of 10 cases of suspected yellow fever in French Equatorial Africa occurring during the period 1937 to January 1939, compared with the results of mouse protection tests in the areas in which they occurred.

Four cases occurred at Port-Gentil and Libreville on the Gabon Coast, and one at Brazzaville, all places connected by rail which could bring carriers from the ports of Dahomey, Ivory Coast and Nigeria. The virus was isolated from the Brazzaville case by inoculation of the blood into susceptible animals. Serological tests in native villages adjoining these towns gave more than 20 per cent. positive, and it is evident that yellow fever is endemic in these regions.

Two cases occurred at Bangui and one at Mobaye in the region of the Oubangui-Chari and one at Berbérati on the Upper Sangha, where very high percentages of positive mouse protection tests were obtained in 1931–33. This region would seem to be infected with the jungle form of yellow fever, with weak powers of diffusion, and the existence of the disease has only been confirmed by systematic viscerotomy in all suspected cases which ended fatally.

Finally, two cases of yellow fever, typical both clinically and histologically, have been found near the opening of the Chari into Lake Chad in a region previously considered free from the disease. However, positive protection tests ranging up to 50 per cent. have been found in this region, and it is suggested that virus may have been imported from Nigeria, where numerous cases have been recorded, and which lies in close proximity to the Chad area. *E. Hindle.*

FINDLAY (G. M.). **The Localization of the Neurotropic Strain of Yellow Fever Virus in the Central Nervous System.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. June 30. Vol. 36. No. 1. pp. 21–24.

The application of Sandler's technique for the localization of virus in the central nervous system by means of insulin hypoglycaemia, to the infection of mice with yellow fever virus.

Six adult mice were starved for 24 hours, then given 0·8 unit of insulin per kgm. of body weight subcutaneously, followed two hours later by an intraperitoneal injection of 0·2 cc. of a 20 per cent. suspension of the brain of a mouse infected with yellow fever. Five of these six mice developed encephalitis.

Further experiments resulted in 32 out of 42 mice being infected in this manner. The effect was shown to be the result of insulin shock and not of any direct toxic action of the insulin. It is suggested that deficiency of oxygen following insulin shock might damage the blood-brain barrier and allow the seepage of virus into the central nervous system. In confirmation of this hypothesis it was found that when adult mice were treated with coal gas, which also produces oxygen deficiency, they could be infected with neurotropic yellow fever virus administered intraperitoneally. *E. Hindle.*

PELTIER (M.), DURIEUX (C.). JONCHÈRE (H.) & ARQUIÉ (E.). Vaccination mixte contre la fièvre jaune et la variole sur des populations indigènes du Sénégal. [**Mixed Vaccination against Yellow Fever and Smallpox in the Native Population of Senegal.**]—*Ann. Inst. Pasteur.* 1940. Sept. Vol. 65. No. 3. pp. 146–169.

A more detailed account of the results of mixed vaccination against yellow fever and smallpox. [See this *Bulletin*, 1940, Vol. 37, p. 92.]

The authors have applied this method of vaccination, by cutaneous scarification of a mixture of neurotropic yellow fever virus and vaccinia, to 98,873 natives in Senegal. The inoculations have been well borne, even by infants, and no serious after-effects have been reported, and in particular no case of yellow fever has been observed.

The results of vaccination were very carefully controlled and in each district several specimens of blood collected from school-children were previously examined in order to determine the serum protection rate. This was followed by mixed vaccination of the school-children and general population, the vaccinial vaccination being checked 8 to 10 days later. Finally two specimens of blood were collected from each subject after an interval of about two months, in order to control the anti-yellow-fever vaccination.

The results are given in tabular form, each district being recorded separately. The vaccinia produced the same percentage of successes as when used alone. The yellow fever virus gave a proportion of 95 per cent. positive serum protection tests and the immunity lasted for at least a year.

In order to obtain the best results the authors consider it essential to observe the following precautions :—

(1) Practise the vaccinations outside the hot season, which lasts from March to June.

(2) Place the vaccination subjects as soon as possible in the shade for at least 10 minutes after vaccination.

(3) Preserve the yellow fever vaccine on ice until the moment it is used.
(4) Use a vaccinial strain resistant to high temperatures, or keep it protected from heat and light.

The authors insist on the advantages of this new method, especially its harmlessness, simplicity and rapidity of execution, and point out that native populations submit much more readily to inoculation by cutaneous scarification than to hypodermic injections. The method has been so successful in Senegal, that it is proposed to extend its use to the populations of the Ivory Coast and French Sudan, and ultimately to other French African Colonies. *E. Hindle.*

Sulzberger (Marion B.) & Asher (C.). **Urticarial and Erythema Multiforme-like Eruptions following Injections of Yellow Fever Vaccine.**—*U. S. Nav. Med. Bull.* 1942. Apr. Vol. 40. No. 2. pp. 411–414.

A description of three cases of skin reactions following injection with yellow fever vaccine. These patients came from different ships and had received injections of different lots of vaccine. The eruptions were of the urticarial and multiform type and were characteristic of mild serum disease and of other mild forms of sensitization to foreign biological agents.

This form of allergic cutaneous reaction after injection with yellow fever vaccine does not seem to have been previously recorded.

E. Hindle.

PLAGUE.

Public Health Reports. 1942. June 12. Vol. 57. No. 24. pp. 903–905.—**Plague Infection Reported in the United States during 1941 in Human Beings.**

Two fatal human cases of plague occurred in the United States during 1941, both in Siskiyou County, California; in each case the source was believed to be ground squirrels. Plague infection has been found in rats or rodents in eight Western States, as far east as North Dakota; a complete list of plague infection in wild rodents or their ectoparasites reported in 1941 is given. *C. W.*

Pardal (Eduardo). Peste en Cañada Grande (Provincia de Cordoba) y en otros lugares de la Provincia de San Luis. [**Plague in Cañada Grande (Province of Cordoba) and in the Province of San Luis, Argentine.**]—*Bol. Sanitario.* Buenos Aires. 1941. Apr.–Dec. Vol. 5. Nos. 4–12. pp. 335–358. With 2 maps.

The area in which the plague epidemic arose contained some 40 habitations within 10 square kilometres and about 250 inhabitants, mostly occupied with rearing goats, sheep and cattle. The interest of the epidemic, involving 11 cases, lies in its origin and its high degree of infectiousness. A certain amount of evidence is available that the first patient contracted the disease from her cat, which died a few days before her own illness and which had probably been infected by field rodents. The patient developed bubonic plague, septicaemia and

secondary pneumonia. From her the disease spread to relations, and from these individually to their relations or to attendants. It became pneumonic. It was not till the third case that the diagnosis was established clinically and bacteriologically. In the investigation which followed it was not found possible to obtain proof of the presence of dead rats. Proof of infection of field rodents and of the existence of an epizootic was forthcoming and consequently this epidemic is characterized as one arising by sylvatic infection. The other cases mentioned and described in the article are single cases which occurred elsewhere in other years. *W. F. Harvey.*

D'Amato (Hugo J.). Profilaxia de la peste en la República Argentina. [**Control of Plague in Argentina.**]—*Bol. Oficina Sanitaria Panamericana.* 1942. July. Vol. 21. No. 7. pp. 656–657. English summary.

"During 1940 there were 138 cases of plague in northern Argentina (provinces of Jujuy, Salta, Tucumán, Santiago del Estero and Rioja), with a mortality rate of 64%. The virus has been spread by wild rodents (*Graomys, Hesperomys, Cavia, Microcavia* and *Galea*), and most human cases had been in direct contact with them. Characteristics of this epidemic were intensive human repercussion and frequency of contamination of domestic rats. Control work was carried out by travelling brigades which took charge of destroying domestic and semidomestic rodents, and left additional poison. They visited 13,579 houses, dealt with 20,909 burrows, and distributed 254,202 packets of arsenic. In 1937 there were only 10 deaths from plague in the whole country, and only 8 in 1938."

Public Health Reports. 1942. May 8. Vol. 57. No. 19. pp. 716–717.—**Live Mouse found on Airplane at Miami Quarantine Station.**

The mouse was found in the galley of the aeroplane on arrival at Miami from Porto Rico. It is pointed out that with the increased use of transport aeroplanes and the carriage of foodstuffs, the opportunities for rats to board, nest in, and be transported by, aeroplanes are increasing. An infected rat may transmit plague to crew or passengers, or may start a focus at some calling point on the journey. The finding of this mouse indicates that there is need for greater vigilance on the part of aeroplane companies and quarantine officers to prevent the transport of rats. *C. W.*

Girard (G.). Caractères essentiels des souches de bacilles pesteux susceptibles d'être utilement employés comme vaccins vivants. [**Essential Characters in Strains of Plague for Use as Living Vaccines.**]—*Ann. Inst. Pasteur.* 1941. Nov. Vol. 67. No. 5. pp. 365–367.

Not every avirulent strain of plague bacillus will make an efficacious living vaccine. Three characters are essential:—(1) Normal growth, especially in broth. Non-antigenic avirulent cultures grow badly, in clumps which deposit, and they tend towards an R type. (2) Persistence of a certain degree of virulence. A nodule should develop at the seat of injection in the guineapig with a dose of 1,000 to 2,000 million

bacilli and disappear by the 12th day. Some splenic reaction is to be expected. (3) Persistence of a certain toxic power. Extracts obtained by freezing and thawing agar cultures according to the technique of GORY and GRASSET, and filtering through a bacterial candle should cause the death of a mouse in eight to 36 hours with subcutaneous doses of 1/20 to 1/4 cc. *W. F. Harvey.*

CHOLERA.

GRIFFITTS (James J.). **The Use of Mucin in Experimental Infections of Mice with** *Vibrio cholerae.*—*Public Health Rep.* 1942. May 8. Vol. 57. No. 19. pp. 707–710.

A 5 per cent. suspension of granular mucin in distilled water with *p*H 7·2–7·4 is used. It is strained through four thicknesses of gauze, sterilized and then kept at 5°C. " The injection of several hundred million living vibrios in saline " intraperitoneally is required to produce death in mice within 18 hours and to give a culture from the heart blood. Suspended in mucin instead of saline a few thousand living and recently isolated cholera vibrios will kill in 16 to 18 hours and cultures may be obtained from the heart blood in 4 to 6 hours. By this method the injection of as few as 5,000 organisms " kills approximately 80 per cent. of the mice within 72 hours," whereas a dose of 50 million organisms in saline " is not fatal to mice." *W. F. Harvey.*

GRIFFITTS (James J.). **Laboratory Studies of the Effect of Sulfonamide Drugs on** *V. cholerae.*—*Public Health Rep.* 1942. May 29. Vol. 57. No. 22. pp. 814–818.

The trials of the value of sulphonamides in cholera, which have so far been undertaken, have not proved satisfactory. It is contended that experimental workers have made use of test doses of the vibrios which are much too large, such as 875,000,000 organisms intraperitoneally in mice. In his *in vitro* experimentation Griffitts uses only 5,000 living cholera vibrios added to 5 cc. broth containing various amounts of drug. " Sulfanilamide, sulfathiazole and sulfadiazine inhibited the growth of this organism; whereas sulfaguanidine and succinyl sulfathiazole did not . . ." Sulphathiazole in 1–8,000 dilution inhibited growth for 24 hours, and 1–1,000 for more than seven days. The inhibitory action of sulphadiazine and sulphanilamide in 1–1,000 dilution was effective for five days and two days respectively. The *in vivo* experiments were carried out by suspending vibrios of Inaba and Ogawa strains in 5 per cent. mucin and injecting five-week old mice of 12 to 14 gm. weight intraperitoneally. In a control series 70 per cent. of mice should die with a dose of 50,000 vibrios and 90 to 100 per cent. with a dose of 500,000. " Mice were given approximately 500,000 living vibrios in mucin by intraperitoneal injection as the challenge dose. Of those given a single injection of sulfathiazole or sulfadiazine 80 to 90 per cent. survived for 24 hours and 50 per cent. survived the 7-day test period." The drug was given one-half to one hour after the infecting dose. It was found that succinyl sulphathiazole and sulphaguanidine, as well as sulphathiazole, protected when the drug was given intragastrically. *W. F. Harvey.*

AMOEBIASIS.

SAWITZ (W. G.) & FAUST (E. C.). **The Probability of detecting Intestinal Protozoa by Successive Stool Examinations.**—*Amer. Jl. Trop. Med.* 1942. Mar. Vol. 22. No. 2. pp. 131–136. With 2 figs. [10 refs.]

With a view to estimating the accuracy of single examinations for intestinal protozoa six normally passed stool specimens from 118 children in a home in New Orleans were examined by two direct methods (iodine and haematoxylin stained films) and by zinc sulphate concentration technique. The results when analysed showed that the efficiency of the examination of a single film for the detection of *Entamoeba histolytica* infections was less than one in five, and ten examinations had to be made for a negative result to be reasonably reliable. By a combination of one of these techniques with zinc sulphate centrifugal floatation about one out of three or four infections was detected in a single examination, and 70 to 90 per cent. of infections in five examinations. The efficiency of film examination for non-pathogenic protozoa was greater than for the pathogenic *E. histolytica*, for one examination detected one out of four infections, while five examinations detected about 80 per cent. If the examination of a single film was combined with centrifugal floatation, one out of two infections was detected. The examination of three film specimens combined with centrifugal floatation disclosed over 80 per cent. of infections. The general conclusion is that the use of the zinc sulphate centrifugal floatation technique in combination with the direct film examination provides greater reliability and ease of detecting intestinal protozoa with fewer specimens than either of the non-concentration techniques. *C. M. Wenyon.*

CHINN (Ben D.), JACOBS (Leon), REARDON (Lucy V.) & REES (C. W.). **The Influence of the Bacterial Flora on the Cultivation of *Endamoeba histolytica*.**—*Amer. Jl. Trop. Med.* 1942. Mar. Vol. 22. No. 2. pp. 137–146.

The investigations on *Entamoeba histolytica* described in this paper are a continuation of those detailed in a paper by REES, REARDON, JACOBS and JONES [this *Bulletin*, 1942, Vol. 39, p. 28]. The medium used was a modified Boeck and Drbohlav medium consisting of whole egg slants with an overlay of Locke's solution. Rice starch is added and sheep serum also if further enrichment is required. Sterile cysts, obtained by the micro-isolation method of the above-named workers, were used for inoculation of the medium. The effect, on excystation, growth and encystation, of 26 species of bacteria and three yeasts, all of which were shown to grow in the medium, was tested. It was found that certain bacteria produce conditions in the medium which stimulate excystation and hydrolyse the proteins and carbohydrates to products essential for multiplication. On the other hand other bacteria are incapable of stimulating excystation, though they are able to provide conditions necessary for growth after excystation has occurred. The amount of growth varies, however, with the organism used and it has been found that a poorly growing culture may be greatly stimulated by the addition of a second bacterium. When the subject of encystation was investigated it was found that cyst formation

rarely occurred with the majority of the organisms tested. It was possible to carry on sub-cultures for many generations without cysts being formed. When, however, *Clostridium perfringens* was added to cultures growing with one or two known bacteria, encystment occurred with a maximum formation between 48 and 72 hours later. It is noteworthy that though the organisms which stimulate growth are not all normal inhabitants of the intestine, *Cl. perfringens* is one which is uniformly present in the human intestinal tract. From the studies outlined above it is felt that bacteria play a significant rôle in the excystation, multiplication and encystation of *E. histolytica* and that investigation of the bacterial action may lead to a knowledge of the conditions necessary to cultivate the amoeba without bacteria.

C. M. Wenyon.

TSUCHIYÁ (H.). **Evaluation of a Culture Method as an Aid in the Diagnosis of Amebiasis.**—*Amer. Jl. Trop. Med.* 1942. Mar. Vol. 22. No. 2. pp. 147–151. [14 refs.]

For the detection of *Entamoeba histolytica* in faecal specimens the author employed three methods—direct film examination, a concentration technique and a culture method, the culture medium consisting of Dorset's egg slant covered with nutrient broth (*p*H 7·0) to which was added a loopful of a mixture of three parts of rice starch and one part of animal charcoal. There was little difference in the results obtained except in the case of carriers passing very few cysts, in which case the culture method revealed 20 infections out of 21, while the concentration technique revealed 14 and direct film examination only 11. It seems evident that the culture method is of definite value in the diagnosis of *E. histolytica* infections. *C. M. Wenyon.*

LEPROSY.

HENDERSON (Howard J.). **A Method for separating Intact Leprosy Bacilli from Leprous Tissue.**—*Proc. Soc. Experim. Biol. & Med.* 1942. May. Vol. 50. No. 1. pp. 92–94. With 1 fig.

The author has found that a buffer solution extract of finely ground leprous spleen does not give, in lepers, any reaction comparable with that provoked by tuberculin in those infected by tubercle bacilli. This may be due to lack of sensitivity of the tissues in leprosy, or it may be that extraction of the leprosy bacilli was hindered by the splenic cells, and that the test fluid was therefore impotent.

It is known that, in emulsions, acid-fast bacilli pass readily from the water to the oil phase. The author therefore obtained leprosy spleen tissue, minced and dried by the cryochem process, ground this in water and homogenized it at 3,000–3,500 lb. pressure. In this material almost all the spleen cells were disrupted but the bacilli were intact. The homogenized material was shaken with an equal volume of olive oil for one hour, and the mixture was then centrifuged. Four layers separated out ; the layer between the oil and water consisted chiefly of acid-fast bacilli, and was separated, washed with acetone and subjected to the cryochem process. This substance is to be used in further studies. Acid-fast bacilli were scanty in the other layers.

C. W.

Henderson (Howard J.), Spaulding (E. H.) & Gault (E. S.). **Demonstration of Globi and Leprosy Bacilli by Fluorescence Microscopy.**—*Proc. Soc. Experim. Biol. & Med.* 1942. May. Vol. 50. No. 1. pp. 91–92. With 1 fig.

The authors present an illustration which shows that direct impression smears from the tissues of leprosy patients, stained with auramine O and examined by fluorescence microscopy, show globi and leprosy bacilli more clearly than when the Ziehl-Neelsen method is used. [For descriptions of the technique of fluorescence microscopy, see *Bulletin of Hygiene*, 1941, Vol. 16, p. 144 ; 1942, Vol. 17, p. 207.] *C. W.*

Racine (W.). A propos de la lèpre. [**Leprosy.**]—*Schweiz. Med. Woch.* 1941. Aug. 9. Vol. 71. No. 32. pp. 936–938. With 2 figs.

An account of a case and a general description of the disease.

HELMINTHIASIS.

Oelkers (H.-A.) & Rathje (W.). Zur Wirkungsweise der Anthelminthica. [**On the Mode of Action of Anthelmintics.**]—*Arch. f. Experim. Path. u. Pharm.* 1941. Nov. 1. Vol. 198. No. 3. pp. 317–337. With 3 figs. [21 refs.]

The authors tested the action *in vitro* of a number of substances, often or occasionally given as remedies for helminth infestations. The principal substances tested were : Filmaron ; santonin ; oil of chenopodium and its two active principles ascaridol and p-cymol ; thymol, clorthymol and chlorcarvacrol ; betanaphthol ; hexyl-resorcinol ; rotenone ; carbon tetrachloride, chloroform, and tetrachlorethylene ; pelletierin sulphate ; menthol ; Lubisan (used for oxyuriasis) ; oleum eucalypti, oleum tanaceti and oleum terebinthinae ; copper sulphate and aluminium chloride. As test-objects they used Enchytraeid worms, living *Ascaris lumbricoides*, which they found better than *Parascaris equorum* because it lived longer in Ringer's solution (7–10 days), and preparations of the muscle of leeches with and without nerve, and of the earthworm without nerve. They also tested the toxicity of the same substances to white mice and to isolated frog heart. For details of their results the paper must be consulted. A description of their technique is not given, but for the work on the muscle preparations they followed the methods of Trendelenburg ; they admit that interpretation of the results obtained with these preparations is difficult, because it is not easy to differentiate between the normal contractions of such preparations and the changes in them produced by the drugs. Frequent references are made to the earlier work by Oelkers and others.

The authors claim that there was in many cases a correspondence between results obtained with Enchytraeidae and *Ascaris lumbricoides* and those obtained with the muscle and nerve-muscle preparations. The effects of the drugs on these were mostly stimulation with or without subsequent paralysis of the muscle, filmaron, thymol, chlorthymol and chlorcarvacrol being very active, while menthol, beta-naphthol, pelletierin sulphate and oil of eucalyptus were only slightly so. Santonin slightly stimulated these preparations and only did so in high

concentrations. Ascaridol was very toxic to Enchytraeids and to living *Ascaris lumbricoides*, but had only a slight action on the muscle and nerve-muscle preparations; whole leeches and earthworms were less sensitive to it. Most of the other drugs were less toxic to *Ascaris lumbricoides* than to the Enchytraeids.

Earthworm muscle preparations without nerve responded more readily than leech muscle without nerve; living whole earthworms suffered more from the drugs than did whole living leeches; substances acting strongly on Enchytraeids and on *Ascaris lumbricoides* were also very toxic to whole leeches and earthworms.

The authors think that substances that are markedly toxic *in vitro* to living worms can be used as worm remedies, even if they are, like ascaridol, not so active against muscle and nerve-muscle preparations of the leech and earthworm; it is more difficult, however, to judge the value of substances that are active against the muscle and nerve-muscle preparations but not against the living worms. The value of santonin as an anthelmintic seems, they think, to have been over estimated; oil of chenopodium and ascaridol are better; possibly santonin acts as a vermifuge, stimulating the muscle and nervous system of the worms. Infusions of *Digenea simplex*, the active principle of helminal (Merck) may prove, for similar reasons, to be a good anthelmintic. Santonin may be, as KOKAME and ASADA suggested, active only after it has formed some kind of combination with the helminth tissues.

When the same drugs were given orally to white mice, most of them were more toxic in watery than in oily emulsions, but only if they were first very finely powdered. The toxic doses of some of them are given in terms of mouse weight. Ascaridol, beta-naphthol, hexyl-resorcinol, santonin, chlorcarvacrol and filmaron were the most toxic; carbon tetrachloride, tetrachlorethylene and chloroform had about the same toxicity; rotenone was highly toxic, although it is practically insoluble in water, and with difficulty in fats; helminal was not toxic to mice.

To isolated frog's heart filmaron alone was toxic in low concentrations; 1–2 mgm. per cent. almost immediately stopped the heart beat and perfusion with fresh Ringer did not restore it; perfusion of 0·1–1 mgm. per cent. of adrenalin did restore its normal action after it had been slowed by 0·4–0·5 mgm. per cent. of filmaron.

The details of the results will interest research workers, but the muscle of nematodes and probably also that of cestodes and trematodes is so different from that of annelids that direct study of the action of possible helminth remedies on the muscle and nerve of helminths themselves should give more valuable results; such a study is now in progress in England. *G. Lapage.*

BAUGÉ (R.). Sur un foyer de bilharziose vésicale dans le Sud Tunisien. [**On a Focus of Vesical Bilharzia in South Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1941. Dec. Vol. 30. No. 3–4. pp. 291–301.

There has been no change in the geographical distribution of bilharzia in the El Oudiane region since CATOUILLARD and GOBERT described it in 1908. In the Djerid the disease is localized entirely in El Oudiane (excepting very rare cases from Tozeur and Nefta) and especially in the villages of Zaiouet el Arab, Zorgane and Ouled Majed. The heaviest incidence was found in Ouled Majed, where all the people are poor and all are gardeners in contact with the infestation from infancy.

Bilharzia in El Oudiane May–June 1941.

Locality	Adults						Children up to 15					
	Males			Females			Males			Females		
	No.	Pos.	%	No.	Pos.	%	No.	Pos.	%	No.	Pos.	%
Zaouiet El Arab	46	22	47·8	6	0	0	40	17	42·5	9	0	0
Zorgane ...	9	6	66·6	5	1	20	9	6	66·6	7	3	42·8
Ouled Majed ...	65	56	86·1	40	22	55	30	24	80	22	16	72·7

The snails live, as Gobert showed, mostly in the Aïn Hamadi, the Aïn Tafrina and the Aïn Karmous. The local people know well that immersion in these is often followed by skin irritation, sometimes erythema, and some months later blood in the urine. The Aïn Tafrina is used as a source of drinking water and women do their washing in it ; this is dangerous, because 10 minutes in water will soften the skin sufficiently to allow cercariae to pass through it. The snail Melanopsis is found everywhere, and 40 per cent. of those in the Aïn Tafrina harbour "*Cercaria vivax*," although the author noted one or two cercariae of Schistosoma also in them. Of the snails in the Aïn Tafrina 10 per cent. harbour cercariae of Schistosoma, but these cercariae are found in only 2 per cent. of the snails in the Aïn Hamadi and the Aïn Karmous. For the destruction of the snails copper sulphate was excellent, although it may render the water unfit for consumption for a while. Ducks are also useful, but in such wide areas unsupervised ducks are liable to be taken by unscrupulous people.

Anthiomaline was given to 15 persons from Ouled Majed infested with *Schistosoma haematobium*. Their ages were 14–30 years, except two aged 50, and all had suffered for 2-10 years. There were no ill effects except slight vertigo in one case, and all continued with their work during treatment. Examinations of the urine the day after each injection showed that after the sixth injection dead (black) eggs appeared in the urine. The injections were given every two days, commencing with 1 cc. and continuing with 2 cc., 3 cc. and 4 cc. ; thereafter the dose of 4 cc. was repeated except when one of 2 cc. was substituted. The case records show that dead eggs appeared in five cases after 14 cc., in six cases after 18 cc., in two cases after 16 cc., in one case after 23 cc. and in one case after 22 cc. Cure was regarded as complete when no eggs were seen in centrifuged urine ; the general condition of the patient then improved. *G. Lapage.*

PENNER (Lawrence R.). **Studies on Dermatitis-producing Schistosomes in Eastern Massachusetts, with Emphasis on the Status of** *Schistosomatium pathlocopticum* **Tanabe, 1923.**—*Jl. Parasitology.* 1942. Apr. Vol. 28. No. 2. pp. 103–116. [18 refs.]

The author studied five of Tanabe's preparations of *Schistosomatium pathlocopticum*, a new genus and species erected by Tanabe for worms developing from cercariae found in *Stagnicola palustris* and put experimentally into white mice and white rats. Penner shows that *S. pathlocopticum* is a synonym of *Schistosomatium douthitti* (Cort, 1914), the natural host of which is, so PRICE believes, the field mouse ; its cercariae can produce water itch or schistosome dermatitis.

Penner could not find schistosome cercariae in 2,781 specimens of *Stagnicola palustris*, either in areas where Tanabe collected (from some of which areas this species of snail seems to have disappeared) or in other areas. Extensive collection of large numbers of freshwater gastropods belonging to ten different genera in ten arbitrarily designated areas in Eastern Massachusetts, including waterways, lakes and ponds where there could be swimming and wading failed to reveal any schistosome infestation, excepting in one *Physella heterostropha*, which had an immature infestation not of the Schistosomatium type; it was similar to *Cercariae physellae* and other related species known to cause dermatitis. There is no water itch problem in the areas examined at present and no substantial evidence that there may be one in the future. Marine gastropods were not examined; possibly some beaches and bays may have snails carrying enough cercariae to produce a dermatitis problem.

In many areas the abundance of the snails that could be intermediate hosts has been reduced or they have been eradicated by covering streams with oil for mosquito control, by their pollution by sewage, etc., by converting lakes and ponds into reservoirs and consequent reduction of the water weeds which feed the snails, by making artificial covered channels for streams and by ducks and rats; in other areas where the snails exist, the definitive hosts seem to have disappeared (the only recognized definitive host of *S. douthitti* found was the brown rat, in which Price showed that its development cannot be completed). Where both definitive and intermediate hosts exist, there is a minimum of swimming and wading. *G. Lapage.*

Nasr (Mahmoud). **The Occurrence of *Prohemistomum vivax* (Sonsino, 1892) Azim, 1933. Infection in Man, with a Redescription of the Parasite.** Reprinted from *Laboratory & Med. Progress.* 1941. Nov. Vol. 2. No. 2. pp. 135–149. With 5 figs. [38 refs.]

One man, aged 30, a fez seller and a resident of Cairo, was admitted to hospital for bilateral pulmonary tuberculosis; he died and five specimens of the Strigeid trematode, *Prohemistomum vivax* were recovered from his small intestine. Dead eggs of *Schistosoma haematobium* and evidence of bilharzial cystitis were also found.

The anatomy of *Prohemistomum vivax* is described in detail with a schematic drawing of it and comparative measurements of its various organs. This small, spoon-shaped trematode was discovered by Looss in the small intestine of the Egyptian kite; it was described by Odhner, who named it *Prohemistomum spinulosum*. Azim obtained *Cercaria vivax* from the gastropod snail *Cleopatra bulimoides* and placed them in the same water as the fishes *Gambusia affinis* and *Tilapia nilotica* (the common *Bolti* of the Nile). Later he found metacercariae in these fishes, allowed dogs and cats to eat their raw flesh and obtained adult flukes from the small intestines of the dogs and cats. These he considered to be identical with *Prohemistomum spinulosum*, but he renamed the species *P. vivax*, because the larval name *vivax*, given to the cercaria by Sonsino, had priority. Lutz and Szidat doubted this diagnosis, but Nasr concludes that differences between Odhner's and Azim's trematodes were due to the fact that Azim's were younger (7 days old) and had also developed in hosts (the dog and cat) that were not so favourable as the kite. Nasr discusses the question whether *Cercaria vivax* of Gafsa in Tunis, found

there in *Cleopatra bulimoides* and *Melanopsis praemorsa*, is identical with Sonsino's *Cercaria vivax* found in *Cleopatra bulimoides* near Cairo and redescribed by Looss. He concludes that it is not. Moreover, *Prohemistomum vivax* has not been recorded from Tunis.

The miracidia of *P. vivax* infest the snails *Cleopatra bulimoides* and *Melanopsis praemorsa* and produce cercariae which either penetrate the skin (especially the thinner skin near the tail or under the fins) or enter the mouth of fishes. Azim has found them in *Tilapia nilotica* (the *Bolti*), *Mugil cephalus*, *M. capito* (grey mullet), *M. auratus* (the *Bouri*), *Clarias anguillaris* (the Carmoot or Karamit, a cat fish) and in tadpoles. The metacercariae develop in these, which are eaten raw or imperfectly cooked by man, dogs, cats and kites (*Milvus migrans aegyptius*), the kite being the best host. Azim found the flukes in 36 and 59 per cent. of Cairo dogs on separate occasions and in 90 per cent. of Cairo cats; none was found in dogs of Alexandria, which could not eat the Nile fishes. Nasr concludes that *P. vivax* is restricted to Egypt and Palestine. He found no record of it in Europe or America.

The adult flukes are not common because they have a short life, produce few eggs (only four or five are present at any one time in the mature uterus) and are small and often overlooked (0·74–1·11 mm. by 0·52–0·61 mm.). Azim, however, recovered 2,000 specimens from a man complaining of dysenteric symptoms. Nasr suggests that many patients diagnosed as dysentery may be infested with this fluke and should be given *Filix mas* to remove it. A survey of the incidence of the various stages in man and other vertebrate hosts, snails and fishes is advisable. *G. Lapage.*

Itoiz (Oscar Anibal). Equinococosis primitiva experimental. Inmunidad y alergia en la hidatidosis; su expresión anatómica. [**Immunity and Allergy in Hydatid Disease.**]—*Bol. Inst. Clín. Quirúrg.* Buenos Aires. 1942. Jan.–Apr. Vol. 18. No. 144. pp. 49–109. With 78 figs. (2 coloured). [53 refs.]

Sawitz (Willi). **The Buoyancy of Certain Nematode Eggs.**—*Jl. Parasitology*. 1942. Apr. Vol. 28. No. 2. pp. 95–102.

The buoyancy of the eggs of *Enterobius vermicularis* and *Trichuris trichiura* of man, *Trichuris vulpis* and *Ancylostoma caninum* of the dog and the fertilized and unfertilized eggs of *Ascaris lumbricoides* was tested in zinc sulphate solutions. The values thus determined are not necessarily their actual specific gravities. For their concentration by centrifugal floatation a solution with a specific gravity higher than that of the eggs is needed.

An emulsion of the faeces mixed by a mechanical stirrer in physiological saline was strained through one layer of cheese cloth and sedimented for 6–12 hours or overnight and the approximate number of eggs in a measured amount of the suspension was determined by resting a cover glass on the ground top of a 10 ml. Wassermann tube containing 45·6 per cent. zinc sulphate solution of specific gravity 1·250. Similar tubes, resting on four metal fingers of their metal holders, were used for centrifugal floatation of the eggs in solutions of different specific gravities. After spinning at 2,640 r.p.m. for 100 seconds, the cover was removed, due regard being given to the care in doing this emphasized by Lane. Repeated spins after refilling the

tube each time gave five such covers. The supernatant fluid was then put into two fresh tubes, the specific gravity was raised by adding zinc sulphate solution of sp. gr. 1·250 or 1·300 till it was over 1·200 and two or three covers were obtained from these. The sediment of the original tube was mixed again with zinc sulphate of sp. gr. 1·250 and 5–7 more covers obtained from it. Finally the sediment of each tube used was examined directly by spreading it on slides, the number of eggs so found being always under 1 per cent. Counts of the eggs on each cover showed the distribution of eggs in the surface layers, upper and lower parts of the supernatant fluid and in the sediment after centrifugation.

The eggs of *E. vermicularis* were floated in a solution of sp. gr. 1·115 or higher. A solution of sp. gr. 1·180 yielded 97 per cent. of the eggs in the surface layer and 70 per cent. on the first cover glass. There was no essential difference when the fully embryonated eggs were tested 24 hours after being passed and after five days in the refrigerator.

The eggs of *T. trichiura* were floated up in solutions of sp. gr. 1·150 and higher. Solutions of sp. gr. 1·180 yielded 85 per cent. of the eggs in the surface layer and 52 per cent. on the first cover glass. Solutions of 1·200 yielded 99 and 90 per cent. respectively. Centrifugation at 2,640 r.p.m. (top speed) for 50 and 280 seconds respectively gave *fewer* eggs than spinning for 100 seconds. Zinc sulphate apparently interacts less with the eggs than does salt solution and so gives more reliable counts.

The eggs of *T. vulpis* were floated up in solutions of sp. gr. 1·150 and higher. Those of *A. caninum* were floated in solutions of sp. gr. of 1·055 and higher. Sp. gr. of 1·150 floated 92 per cent., sp. gr. 1·180 floated 100 per cent. with 87 per cent. on the first cover glass. This agrees with Lane's finding that a sp. gr. of 1·150 is needed for floating up human hookworm eggs [this *Bulletin*, 1940, Vol. 37, p. 477]. The fertilized eggs of *A. lumbricoides* differed in buoyancy in different experiments between sp. gr. 1·110 and 1·130. Solutions of sp. gr. 1·180 floated almost all of them, with 57–79 per cent. on the first cover glass. Solutions of sp. gr. 1·200 gave 94 per cent. on the first cover glass. Solutions of sp. gr. 1·200 floated only 39 per cent. of the unfertilized eggs, while solutions of sp. gr. 1·250 floated 99 per cent. of these. *G. Lapage.*

ANDREWS (Justin). **New Methods of Hookworm Disease Investigation and Control.**—*Amer. Jl. Public Health.* 1942. Mar. Vol. 32. No. 3. pp. 282–288. With 3 figs. [12 refs.]

In spite of a marked reduction in the incidence and, presumably, in the intensity of hookworm disease in the southern American States, the disease still causes physical disability and economic handicap and attempts to control it are expensive. Almost all State and local health authorities still think that hookworm infestation is tantamount to hookworm disease; anthelmintic treatment is not related to the clinical condition, the relative size of the worm burden or the probability of prompt re-infection; laboratory, epidemiological, engineering, nursing and administrative activities are often not co-ordinated and much waste of effort occurs.

In Georgia a parasitologist directs the Hookworm Service established late in 1939 and he approves requests for hookworm surveys, so that

wastage of effort is avoided. First the incidence of hookworm infestation for the previous 10 years was tabulated by year and county and a map of Georgia showing it was made (illustrated). Local health personnel were told that, if hookworms remove blood more quickly than it can be replaced, anaemia results; if not, there is a subclinical infestation; the primary object should be to detect, prevent and control the disease rather than the subclinical condition; disease will be more likely and more severe where worm burdens are high and iron-protein consumption low; where iron-protein consumption is adequate, subclinical conditions will in general occur whatever the worm burden; where it is low, chronic progressive anaemia will result whether hookworms are present or not, so that all anaemia is not necessarily due to hookworms and cases that are not must be differentiated from those that are; the intensity as well as the incidence of hookworm infestation must be known and related to the diet and anaemia of the people.

A programme of attack was devised, based on the facts that: (1) Hookworm disease is absent where there are approved facilities for disposal of domestic and school excreta; areas where these exist can be omitted; (2) hookworm larvae develop best in sandy and sandy-loam soils, so that strictly clay regions can be omitted; (3) the disease is rarely a problem in Negroes, who can be omitted; (4) it occurs chiefly among the poorer classes; (5) families rather than individuals should be studied; (6) the average individual worm burden tends to increase with the number of infested members of a family, so that large families are more likely to reveal the disease.

Thus most cases will be found by examination of large, white, low-income families living on sandy or sandy-loam soils without proper facilities for disposal of excreta and with evident clinical anaemia.

By home visiting of families selected on this basis faecal samples were collected from one or more anaemic members of each family under 20 years of age (because most cases in Georgia are under 20) and examined by brine floatation; egg counts were made in positive cases by Stoll and Hausheer's small drop dilution method. School surveys preceded home visiting where sandy soils, poverty and insanitation predominated. The earlier method of examining all members of suspected families had to be abandoned because of practical difficulties, but the work showed that the egg count of the first anaemic member of a family under 20 to be examined roughly represented the average intensity of infestation of all the members of that family under 20. Follow-up counts of individuals with counts of 2,000 eggs per cc. or more were done at first, but, after further work, this figure was raised to 5,000 eggs per cc. or more.

These methods must miss some cases, but it is claimed that they reveal the bulk of the hookworm morbidity with a minimum expenditure of time, travel and materials. They exclude the much larger group of cases with hookworms but no disease; there is no useful health purpose in trying to eliminate hookworms from these. These patients generally suffer from iron deficiency, dietary anaemia being more prevalent in Georgia, and apparently also in Florida, than the hookworm disease often, and perhaps always, associated with it; the two should be attacked together.

When hookworm has been found in families, medical men treat them, anthelmintics being provided free. Haemoglobin recovery after worm removal is slow unless iron is given, especially when iron is

deficient in the diet. Iron, without worm removal, will rapidly improve the blood picture, but the improvement is not sustained. Iron is therefore given, mostly as Blaud's pills, before deworming if the anaemia is very severe (Hb. 5 gm. or less) and after deworming if it is moderate. Greater intake of iron is encouraged. The sale and use of sewage disposal structures is promoted, but little effect is expected from this, because so few can afford them. If no sanitary facilities can be provided, all members of a family are urged to have two worm treatments during the cold months, to reduce the worm burdens at the time when re-infestation from each other is less likely than in the summer. AUGUSTINE'S observation in Alabama that polluted soils do not contain larvae from the end of December until March (temperatures below 50°C. are unfavourable to them) is confirmed in Georgia, and the likelihood of re-infection then is further decreased by the fact that the people wear boots then if they wear them at all. Andrews showed that two treatments with tetrachlorethylene completely removes the worms from about 90 per cent. of patients and reduces the egg output by 99 per cent. If these treatments were given during the winter, it is unlikely that the disease would reach clinical intensity for several years. *G. Lapage.*

MILLSPAUGH (J. A.) & SOMPAYRAC (L. M.). **Creeping Eruption. Infestation with** ***Ankylostoma braziliense*** **Larvae.**—*U. S. Nav. Med. Bull.* 1942. Apr. Vol. 40. No. 2. pp. 393–396. With 1 plate.

Skin infestation by the larvae of *Ancylostoma brasiliense*, a nematode (hookworm) parasite inhabiting the small intestines of the dog and cat, incapacitates increasing numbers of persons employed in naval expansion in an area where the disease is endemic, namely, the American Atlantic seaboard, the Mexican Gulf and neighbouring islands, and Central and South America. Infestation comes especially from moist, sandy soils contaminated by the faeces of dogs and cats and is worse during hot, rainy seasons. Men who work in contact with moist soil are especially liable, but everyone is susceptible. Most of the cases seen were in men who had lain about the soft, white sands of the beaches of Jacksonville, Fla., which are not normally washed by tides; when they are washed by storms or chilled in winter, cases are fewer.

When the larva penetrates the skin a stinging pain is felt, similar to that caused by a mosquito bite. Within one to three days itching indurated papules appear, which develop into tortuous, raised, erythematous migratory lines 1–2 mm. wide, which mark the progress of the larvae; these tracks may cross, double back and produce erratic patterns. A photograph of a patient shows these lesions. The larvae may cover 1–30 cm. in 24 hours, but they rarely go beyond a few inches from the point of penetration. As the eruption advances at one end it fades at the other. Warmth quickens the progress of the larvae and they move further during the night, when the itching is especially troublesome. Sepsis readily follows excoriation caused by scratching. The only general manifestations are eosinophilia and fatigue due to loss of sleep. No adults of *A. brasiliense* were found in the stools of the patients.

The treatment recommended is: (1) Refrigeration by the ethyl chloride spray directed 0·5–3 cm. in front of the acutely inflamed end

of the burrow, where the larva is situated ; spraying should be continued to the blanching stage and until the skin feels like old leather to the fingers ; any burn produced is not serious ; spraying may have to be repeated on burrows in thick skin, *e.g.* on the sole of the foot ; (2) the galvanic cautery after injection of 0·5–1 per cent. procaine ; cauterization should be continued until a small burn is produced ; one application is enough. To locate the larva wash the skin with 70 per cent. alcohol, apply cedarwood oil and examine with a lens or with the low power of the microscope ; the area round the larvae can then be seen as a yellowish-white mass or a collection of small vesicles.

Control measures comprise the exclusion of dogs and cats from the beaches, restriction of bathers to parts of the beach that are washed by the tides, the wearing of shoes, and avoidance of contact with damp sand or soil, and the treatment of dogs and cats with tetrachlorethylene to remove the worms. *G. Lapage.*

MAPLESTONE (P. A.). *Trichostrongylus* **Infection in Man.**—*Indian Med. Gaz.* 1941. Dec. Vol. 76. No. 12. pp. 710–712. With 1 text fig. & 1 fig. on plate.

Trichostrongylus is not common in man, and only a few worms are present at a time ; they do not usually cause objectionable symptoms, but their eggs are often confused with those of hookworms and many persons with so-called incurable hookworm infestations are found to be passing eggs of Trichostrongylus only. No known anthelmintic will eradicate Trichostrongylus in man [phenothiazine might be tried with a careful watch for the transient anaemia it may cause] ; in consequence, when eggs of Trichostrongylus are confused with those of hookworms, false impressions of the efficacy of hookworm remedies may be obtained.

Measurements of 20 eggs of Trichostrongylus and 20 of those of hookworms showed that Trichostrongylus eggs are larger, being 95·5–80·2 microns long by 55·3–42·4 microns broad, average 88·8 by 48·3, while those of hookworms were 66·2–57 microns long by 42–38 broad, average 62 by 40·8 ; occasionally the eggs of both may be bigger. One pole of the egg of Trichostrongylus is more pointed ; it is more like a bird's egg ; hookworm eggs are equally rounded at both poles. Microphotographs illustrate this.

Trichostrongylus appears to be widely spread in India, but records of it are often missed. Maplestone thinks it is almost, if not quite, as widespread as hookworms. BOULENGER, working when modern concentration methods were not in use, found the eggs of it in 1·2 per cent. of Indian hospital patients examined in Mesopotamia in the Great War and thought the incidence twice as high ; Maplestone thinks that even that is too low an estimate. CHANDLER, using LANE'S centrifuge technique, found the eggs in 10 per cent. or more of workers in Bengal tea gardens, where Maplestone found them in 9·1–25 per cent., according to the season. Chandler found them in 1 per cent. at Poona, 9 per cent. at Dharwar and 0·5 per cent. in Madras. Records of the Calcutta School of Medicine show Trichostrongylus in 1·1 per cent. of 15,578 stools examined during 11 years. SWEET, by simple floatation, found them in 0·4 per cent. of 11,000 stools in Mysore. These records refer to the eggs only ; there appear to be no records of the identification of the species of Trichostrongylus found, but

Maplestone is inclined to agree with the general assumption that the species is *T. colubriformis*. *T. colubriformis*, *T. probulurus* and *T. vitrinus*, which are parasites of sheep, oxen and other ungulates, seem to be only occasional parasites of man, but *T. orientalis* has been reported frequently in man by KOINO. Koino states that mice can be infested by the mouth or through the skin with *T. orientalis*, whose life cycle is like that of hookworms, so that man may acquire it as he acquires hookworms. *G. Lapage.*

SECK (Paul) & SCHUMACHER (Walther). Ein Beitrag zur Abtötung von Spulwurmeiern. [**The Killing of Ascarid Eggs.**]—*Zent. f. Bakt.* I. Abt. Orig. 1942. Feb. 16. Vol. 148. No. 6. pp. 314–317. With 2 figs. [15 refs.]

Disinfection of farm buildings by cold or heat (hot water or the blow lamp) is not practicable. Chemical means are even more difficult. ENIGK and others showed that of the three layers of the ascarid egg the innermost fatty layer is the only one that resists chemicals ; lipoid solvents which penetrate deeply and can be sprayed on infested surfaces are therefore required. Enigk found that a 2 per cent. emulsion of carbon disulphide in water killed eggs of *Toxocara canis* and *Toxascaris leonina* in 5 minutes and in 20 seconds when 2 per cent. phenol was added to the emulsion.

The authors tested Eimeran, a chlorinated coal tar preparation containing organically combined sulphur, which is used to kill coccidian oöcysts. They proved it efficacious against oöcysts, the reason probably being that the innermost layer of these is also fatty. They found it effective against the eggs of *Parascaris equorum* taken from the uteri of worms obtained in the slaughter house. Eggs were put in a centrifuge tube and flooded with a 5 per cent. solution of Eimeran ; after a time they were recovered, washed and put aside at room temperature and their development was watched. After 2½ minutes in the Eimeran all the eggs were killed ; no development had occurred in them after 16 days, by which time untreated eggs had completed their development.

Similar work with embryonated eggs showed that a longer immersion in 5 per cent. Eimeran was needed to kill these. After 2½ minutes 48 per cent. were killed, after 5 minutes 91 per cent., and after 7½ minutes 97 per cent. The killed eggs were markedly deformed. Larvae in untreated controls were motile.

The authors think Eimeran would be effective against the eggs of other ascaroid species, because Enigk showed that the eggs of species in birds were not appreciably more resistant than those of dogs and ZAWADOWSKY claims that there is little difference in the resistance of the eggs of the ascarids in various mammals. Strongyle eggs are less resistant than those of Ascaris and should be killed more quickly by Eimeran.

To test the efficacy of Eimeran against coccidian oöcysts the authors sprayed a 5 per cent. solution of it on a rabbit house with a floor space of 70×80 cm. covered with a layer of faeces about 0·5 cm. thick. The oöcysts were killed. In sunny weather with a maximum day temperature of 28°C. the sprayed surfaces retained their dampness for 120 minutes. *G. Lapage.*

i. Low (G. Carmichael). **The Nomenclature of the Pacific Filaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941. Nov. 29. Vol. 35. No. 3. pp. 197–198.

ii. Manson-Bahr (Philip). **Zoological Nomenclature as Applied to Medical Zoology, Parasitology and Bacteriology. With Special Reference to the Status of the Pacific Filaria.** [Correspondence.]—*Ibid.* 1942. Jan. 31. Vol. 35. No. 4. pp. 237–239.

iii. Lane (Clayton). **The Name of the Nonperiodic *Wuchereria* of the Pacific.**—*Ibid.* 1942. May 5. Vol. 35. No. 6. pp. 327–332. [10 refs.]

iv. Baylis (H. A.). **Zoological Nomenclature and Medical Science.** [Correspondence.]—*Ibid.* pp. 333–334.

These papers are concerned with the nomenclature of the filaria of the Pacific, and with the suggestion made by Manson-Bahr [this *Bulletin*, 1941, Vol. 38, p. 361] that, in view of its biological differences from *Wuchereria bancrofti* in other parts of the world, it should be known as *Wuchereria pacifica*.

i. Low points out that zoological classification is based upon morphological characters [which is admitted by Manson-Bahr] and that where differences are slight, as between *W. bancrofti* and *W. malayi*, a trinomial name, indicating sub-specific differences, may be advisable; for instance, the latter may perhaps be known as *W. bancrofti malayi*. With reference to the Pacific filaria, Low recalls that the embryo found in the Philippines by Ashburn and Craig in 1906, if it was of *W. bancrofti*, could not be re-named, but if, as Manson-Bahr suggests, it was of *W. malayi*, then the name *philippinensis*, given by those authors, holds good. Again, if that embryo was the same as the Pacific form, then the Pacific filaria must be named *W. philippinensis* or *W. bancrofti philippinensis* if any change is made, and therefore the specific name *pacifica* is ruled out. He concludes, finally, that the Pacific filaria must be regarded only as a biological race of *W. bancrofti*.

ii. Manson-Bahr admits that his original suggestion overstepped the limits of strict zoological nomenclature, but claims that strict application of those rules cannot be, and in fact is not, enforced in medical zoology. He argues that biological features should be taken into account in nomenclature, where those features are important in differentiation and in human medical interest, and gives the instances of the races of *Anopheles maculipennis* (whose only morphological difference is in the egg stage), *Trypanosoma rhodesiense* and *T. gambiense* (morphologically identical), *Leishmania donovani*, *L. infantum*, *L. americana* and *L. tropica*, and the spirochaetes of relapsing fever. All these are commonly known by the different names, but cannot be distinguished morphologically. In bacteriology the rules break down [but bacteriology is not zoology]. He makes a plea for a new International Standard, in view of the importance of factors other than morphology in medical parasitology and therefore in nomenclature in relation to medicine.

iii. Lane cannot accept Manson-Bahr's suggestion because he holds that zoological classification need not relate to medical matters and that nomenclature is a purely zoological concern. He makes the point that because infringements have already been made, this does not justify others. With regard to the Pacific filaria, he denies that periodicity is a valid differentiation, and considers that the clinical differences in filariasis are due to reactions of the host rather than of

the parasite, possibly because of the difference of dress habits, and therefore of areas of skin attacked by mosquitoes. He states that non-periodic infection has been found in the Sudan, and that, therefore, geographical differentiation is not possible. *Aëdes variegatus* is as easily infected by the periodic as by the non-periodic strains—this, therefore, cannot be taken as a differentiation [but there seems to be some evidence that the non-periodic form does not readily infect *Culex fatigans*, the common vector of the periodic form].

iv. Baylis states that the rules of zoological nomenclature do not exclude differentiation on physiological or biological grounds; he considers that, until examination of a large number of specimens is made, to exclude possible slight morphological differences, it would be preferable to adopt Low's suggestion that the non-periodic form be regarded as a race or variety, with a trinomial designation which, however, may prove to be a synonym of an existing name. *C. W.*

Vargas (Luis). Nota sobre el papel de algunos artrópodos en la transmisión de *Onchocerca volvulus*. [**Investigation of the Transmission of *O. volvulus* by Certain Arthropods.**]—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1941. Dec. Vol. 2. No. 3–4. pp. 365–373. [18 refs.] English summary.

"To onchocerca-infected individuals who by previous examination showed microfilariae in the skin we applied different arthropods who were dissected after their repletion with blood. We looked in the Malphighian tubes, mid and posterior intestine for microfilariae. Only one out of 55 *Cimex lectularius* showed microfilariae, or 1·8 per cent. of the total. Of 24 *Triatoma picturata* only two, or 8·3 per cent. of the total, were infected. Of 49 *Pediculus humanus corporis* and of 23 *Pediculus humanus capitis* only 3 had microfilariae. All the 33 *Aedes aegypti* and the 10 *Anopheles pseudopunctipennis* were negative. Twenty-seven *Ornithodoros turicata* were examined of whom 12, or 44 per cent., were positive.

"Probably *Simulium, Culicoides* and ticks can take microfilariae due to the arrangement of the maxillae and hypostoma teeth. We can discard the ticks as vectors considering the *Culicoides* for future investigations."

Elliott (Mountjoy). **A New Treatment for Dracontiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. May 5. Vol. 35. No. 6. pp. 291–301. With 1 fig. & 1 chart.

The author discusses the incidence, pathology, diagnosis and clinical signs of dracontiasis. Few reliable figures of its incidence are available. The blood picture does not help diagnosis; intradermal tests are rarely necessary. A patient showing a bullous blister or sinuses on the feet or legs in a district where the disease is endemic almost certainly has dracontiasis. At earlier stages the shape of the worm may be seen under the skin when this is viewed by reflected light after spraying it with ethyl chloride. Worms pointing in unusual positions, such as the thighs, hip, scrotum, hands, forearm and chest may confuse diagnosis. If the worm is deep or is burrowing along fascial planes, a wrong diagnosis of carbuncle, deep cellulitis, gumma, onchocerciasis, rheumatism, acute focal myositis, sciatica, focal periostitis, etc., may be made. X-rays may show up calcified tracks of the worm. In such cases the patient's opinion is often valuable.

Six clinical types occur : (1) worm in the tissues, no sinus, blister or visible tract, no inflammation ; (2) the same, but with inflammation ; (3) blister, sinus, visible track or worm pointing at a sinus ; no inflammation ; (4) the same, but infected ; (5) residual types with fibrotic infiltration of the tissues, *e.g.*, skin, muscles, tendons, joints ; mechanical defects in associated structures ; (6) the same, but no interference with mechanism or locomotion.

Attempts to extract the worm surgically are usually unsuccessful and serious infection may follow them.

The author tried injections of phenothiazine with success. He emphasizes that his method of preparing the drug and the technique of injection must be strictly followed. He quotes some of the literature dealing with the toxic effects that have been attributed to phenothiazine [see this *Bulletin*, 1942, Vol. 39, pp. 192–193; 464–465; 560], but none of the 23 cases he treated showed any ill effects, although he gave as much as 8 gm. intramuscularly in doses of 2 gm. at weekly intervals.

Packing phenothiazine into incisions in the thigh was first tried, but little phenothiazine was absorbed into the blood ; when sterile tablets were inserted under the fascia lata of the thigh more promising results followed ; but injections were best. The author prepared an emulsion of phenothiazine in olive oil and adeps lanae and sterilized and stored it in medicine bottles (2 oz.) [but unfortunately does not clearly state the proportion of phenothiazine in the emulsion. From the summary at the end of the paper one is led to infer that 20 cc. of emulsion contain 1 gm. phenothiazine]. He describes his technique in detail, giving as an example a guineaworm sinus on the dorsum of the left foot with palpable tender induration of the associated calf muscles. Three injections are first made with 3 per cent. Novutox, the first (2 cc.) into the vastus medialis muscle of the left thigh slightly to the outer side of its centre, leaving the needle in, the second into the calf muscles of the upper third of the left leg and the third into the dorsum of the lower third of the left leg avoiding the tendo achillis. Phenothiazine emulsion is then poured from a medicine bottle, previously put into boiling water, into a spirit-fired pot and 20 cc. are taken into a 20 cc. syringe. After removing the needle marking the site of the first injection into the thigh, 20 cc. of phenothiazine emulsion are injected along the track of this needle, by means of a Bristol transfusion needle. The emulsion must not be too cool or it will block the needle. In a similar way 10 cc. of emulsion are injected into each of the other sites where Novutox was injected. The injection sites are firmly massaged for a few minutes. Both local and general concentration of the drug are important, and half the emulsion must be injected as near the worm as possible. With multiple infestations many points may have to be injected, and it is perfectly safe to give as much as 4 gm. phenothiazine at a sitting. Injections are given at weekly intervals ; more than two courses are rarely needed ; injections are always intramuscular, never into sinuses.

Out of 59 cases treated in a general military hospital in West Africa, 56 were Nigerians, three from Sierra Leone. Of the 23 treated with phenothiazine injections none relapsed and none showed any toxic signs or symptoms although as much as 8 gm. was given (2 gm. at weekly intervals). Since the introduction of phenothiazine, no cases have been boarded out of the army ; this is in great contrast to the results of older methods of attempted extraction of the worm. The full effects

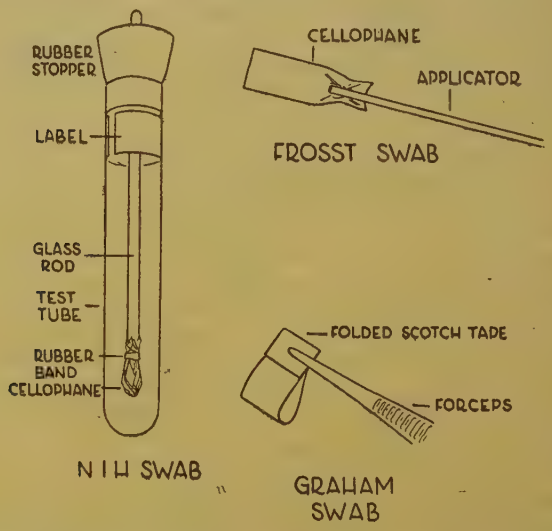
of phenothiazine need 5–7 days; if a worm is being extracted it is better to wait this time after injections before continuing to extract. After injections it is often possible to extract over a foot of worm at a time. If no worm is presenting and there is simply a discharging sinus or tissue induration without sinuses, injections of phenothiazine in one or two places in the affected area will reduce the induration and dry up the sinuses in 10–14 days. Nursing staff should be trained to precede attempts to extract worms by strong pressure along the worm track with the fingers for about two minutes (milking action) and after each attempt to fix the stick to the skin with strapping and to cover with a dry sterile dressing. *G. Lapage.*

MOORTHY (V. N.). **Recent Advances in Guinea-Worm Studies.**—Reprinted from *Madras Med. College Magazine.* 1942. Jan. Vol. 21. No. 2. 12 pp. With 20 figs. on 4 plates. [10 refs.]

KUITUNEN-EKBAUM (E.). **Diagnosis of Enterobiasis: (Evaluation of Recent Devices).**—*Canadian Public Health Jl.* 1942. Apr. Vol. 33. No. 4. pp. 174–176. With 1 fig.

The unreliability of faecal examination for discovery of ova of Enterobius is acknowledged, the reason being that the female migrates to the perianal region and oviposits on the skin outside. Hence, the device of utilizing swabs for obtaining material for examination. The author compares three forms in common use, the NIH (National Institute of Health), the Graham swab and the Frosst swab. The accompanying sketch in the article will save a long descriptive account.

The first, enclosed in a container, can easily be sent by post and examined at leisure even after some weeks, the Cellophane being



Diagrams illustrating the NIH swab, the Graham swab, and the Frosst swab, for collecting material for the examination of pinworm infection.

[Reproduced from the *Canadian Public Health Journal.*]

mounted in water or N/10 NaOH on a slide, and gently flattened smooth by pressure of a coverslip. The second is less firm than the first, and, since the "Scotch Cellulose Tape" is folded with the adhesive surface on the other side, may stick to the patient's skin and cause some discomfort to remove. In its favour is the fact that it can be stuck down on a slide for posting. The third (Frosst) has not been found so useful, because the Cellophane is merely glued on to the handle and may drop off, during or after the swabbing and contaminate the bed or clothing of the patient or the hand of the operator. It cannot easily be sent to the laboratory for examination.

For these reasons the author recommends the NIH swab as the most convenient and efficient. *H. Harold Scott.*

Miller (Max J.) & Allen (Della). **Studies on Pinworm Infections. III. Tests with Phenothiazine in the Treatment of Pinworm Infections.**—*Canadian Med. Assoc. Jl.* 1942. Feb. Vol. 46. No. 2. pp. 111–115. With 6 charts.

All the children treated were males, between 4 and 12 years old; all were positive by the NIH anal swab method. To 48 were given tablets of gentian violet with a water-soluble coating whose thickness was adjusted so that the tablets were kept intact until they reached the vicinity of the caecum. To 75, Merck's 99 per cent. pure recrystallized phenothiazine was given in chocolate tablets made by melting chocolate, mixing the drug with it with an electric stirrer and making the mixture into tablets containing 1 gm. phenothiazine in each with either 3 or 4½ gm. chocolate. The 1 in 4½ mixture was very popular with the children; a few objected to the other. The size of disintegrating tablets and gelatin capsules containing the drug made them unsuitable for children.

In experiment I, children of 4–6 years had 1 gm. daily for six consecutive days (6 gm.); those of 7–9 years had the same daily dose for seven days (7 gm.); those of 10–12 years had the same daily dose for eight days (8 gm.). These doses were given to 50 children and were compared with gentian violet given to 48 others, of whom those aged 6–9 years had 1 gm. gentian violet daily for 10 days, those aged 10–12 years had 1·5 gm. daily for 10 days, the doses being not consecutive, but given in two 5-day periods separated by 1 day free from treatment. Phenothiazine removed the infestation from 64 per cent. of these children and gentian violet removed it from 60 per cent. (Previous work by Miller and others showed that gentian violet, given in the same doses, was effective in 90 per cent. of children).

In experiment II, 23 children, all eight years old, were each given 7 gm. of phenothiazine on three consecutive days in doses of 2·5, 2·5 and 2 gm. All 23 were cured. The treatment of two others of this group was stopped (when they were still positive) after 5 gm. had been given, because these two children showed, on the third day of treatment, abdominal cramps, pallor, weakness and a small, rapid pulse; neither of them showed a significant drop in their haemoglobin, but one had "a cardiac defect."

The effect of treatment was checked by NIH swabs taken "on seven consecutive days for each negative child." It was found necessary to wait at least eight days after treatment ceased before taking these swabs; they were taken too early in the first experiment, so that its results may indicate an efficiency lower than was actually the case.

The authors conclude that phenothiazine is probably more efficient than gentian violet; but it produced a definite, though in most cases slight and transient, anaemia in at least half the children treated. The haemoglobin was lowest 4–7 days after treatment ceased and reached normal again in 3–4 weeks, but all the children were sickly before treatment and had a rather low haemoglobin level. In the first experiment the greatest drop in haemoglobin was 29 per cent. and in the second 32 per cent., but the average drop in both was about the same (1·6 gm. and 1·5 gm. respectively); the drop, however, in the second experiment, in which the phenothiazine was given over a shorter time, was quicker, the lowest point being reached on the 7th day as compared with the 13th day in the first experiment. Phenothiazine is more effective if it is given over a shorter time without decreasing the dose, but there is some evidence that it may then be more toxic. Further study of its haemolytic and possible toxic properties is needed before it can be recommended for use for children.

Reference is made to the work of KUITUNEN-EKBAUM [this *Bulletin*, 1942, Vol. 39, p. 192] who found that phenothiazine removed Enterobius from 86 per cent. of 89 children and from eight out of nine adults without ill effects, and of MANSON-BAHR [this *Bulletin*, 1942, Vol. 39, p. 6], who also found it good against Enterobius, without toxic effects. DEEDS and others [*Jl. Pharm. & Experim. Therap.*, 1939, Vol. 65, p. 354] found that it produced a transient anaemia in three adults treated for infections of the urinary tract, and *The Lancet* [this *Bulletin*, 1942, Vol. 39, p. 193] records the only case known to the abstracter, of the death of a child after treatment with phenothiazine. DAVEY and INNES [*Vet. Bulletin*, 1942, Vol. 12, pp. R7–R14] review the extensive literature on the use of this drug for nematode infestations of man and farm animals and discuss its toxicity; to some of this literature Miller and Allen also refer. *G. Lapage.*

AUGUSTINE (D. L.). **Trichinosis and Enterobiasis: their Importance in New England.**—*New England Jl. of Med.* 1942. Mar. 19. Vol. 226. No. 12. pp. 488–495. [68 refs.]

i. MAPLESTONE (P. A.) & BHADURI (N. V.). **A Record of *Trichinella spiralis* (Owen, 1835) in India.**—*Indian Med. Gaz.* 1942. Apr. Vol. 77. No. 4. pp. 193–195. [12 refs.]

ii. INDIAN MEDICAL GAZETTE. 1942. Apr. Vol. 77. No. 4. pp. 223–224.—**Trichinelliasis.**

i. In the first of these two articles the authors record the fact that they have found numerous larvae of *Trichinella spiralis* in one cat only (the 74th examined) in the course of an examination of 100 pigs, 100 rats, 100 dogs and 74 cats in India during the past few years.

After searching the literature as far back as 1865 the authors claim that this is the first authentic record of the occurrence of *Trichinella spiralis* in India. The wide distribution of *T. spiralis* suggests that it is odd that it has not been recorded earlier in India. In man in India it appears, therefore, to be by no means prevalent and infestations may be so slight that they are overlooked.

The diaphragms only of the above-mentioned animals were examined by digesting them in artificial gastric juice overnight and then screening

the material and extracting the larvae with a Baermann apparatus. When the larvae are alive this is a better method than microscopic examination, but it may fail to reveal dead larvae, because these may not pass through a Baermann apparatus. The reported incidence may therefore be slightly lower than the actual. This discovery of *Trichinella spiralis* in India means that human infestation with this parasite is possible there.

The life history of the parasite, the symptoms, course and pathology of the disease, its prognosis, epidemiology and the lack of any treatment other than that which alleviates the symptoms are discussed. Diagnosis is difficult ; the disease may simulate influenza, typhoid, etc.: haemorrhages under the nails resembling splinters are common [sudden oedema of the eyelids and sometimes of the face, hands and body in cases resembling influenza or typhoid was a striking feature of the recent outbreaks in England (see *Bulletin of Hygiene*, 1941, Vol. 16, p. 289)]. There is often a history of the consumption of raw or imperfectly cooked pork.

Complete eradication of the disease is very difficult, because the parasite can live in almost any carnivore ; the parasite does not depend on man for its maintenance. The rat is probably the most important host, but the pig is the only one that is a direct danger to man. In the cities the only pigs that escape efficient meat inspection are the lightly infested ones and the escape of these from condemnation cannot be prevented. The meat derived from them is diluted with healthy meat when sausages are made, so that a relatively large number of light infestations of man may result and these may be too slight to be noticed. In country places, where there is no meat inspection and where farmers distribute pig meat privately, few people may be heavily infested. Prophylactic measures include the discouragement of the consumption of raw or imperfectly cooked pig meat and the prevention of giving uncooked pig meat to pigs.

ii. In the second article Maplestone amplifies the information in the first article, pointing out that this authentic finding of *T. spiralis* in India does not mean that trichiniasis is now, or is likely to be in the near future, a serious problem, but that it could become so. Although man is normally infested from the pig, some primitive races eat dogs, cats and such other small mammals as they can catch and may acquire the disease from these. The caste rule against eating pork acts as a natural preventive for large numbers of the people of India, but this is not enough to explain the apparent rarity of the parasite in that country. The literature quoted shows that the best public health services in the world have failed to eradicate the parasite completely from any country. In the United States it was found that the examination of pig carcases was so expensive in time and money that a better policy was compulsory giving of only cooked food to pigs. The disease may smoulder unsuspected in a country for years, mild cases escaping recognition and this may be especially true of India, where large portions of the rural population are far away from medical aid and little is known of the causes of their death and illness, excepting the commonest diseases ; further, isolated primitive communities are among the chief pig breeders in the country.

It is odd that *T. spiralis* does not seem to have been found in Asia, the Pacific Islands or Australia, although it is recorded from North and South America, parts of Africa and Europe ; it seems to be commoner in temperate than in tropical countries. [For a fuller discussion of the

diagnosis and epidemiology of the recent outbreaks in England see this *Bulletin*, 1942, Vol. 39, pp. 196, 197 ; *Bulletin of Hygiene*, 1942, Vol. 16, pp. 289, 290.] *G. Lapage.*

DEFICIENCY DISEASES.

STANNUS (Hugh S.). **Infantile Beriberi and Beriberi Heart.**—*Lancet.* 1942. June 27. pp. 756–759. [30 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Ths history of research on infant beriberi, a condition analogous to acute cardiac breakdown in fulminant adult beriberi, is traced. The theory of Japanese workers that the condition is due to an increase in methylglyoxal in the mother's milk consequent on a low content of glyoxalase conditioned by vitamin B_1 deficiency, has probably much truth in it. The increase of bisulphite-binding substances (BBS) in beriberi is not all due to pyruvic acid, and treatment with vitamin B_1 may cause a fall in the blood pyruvic acid with only a slight reduction in the BBS. It is known that exercise in vitamin B_1-deficient subjects may cause a large rise in the BBS, followed by fulminant beriberi. PLATT and LU concluded that pyruvic acid itself was not the direct cause of the acute heart failure, but the author considers that some substance associated with disordered carbohydrate metabolism in muscle plays a part in the beriberi syndrome. Though methylglyoxal is not included in the accepted scheme of carbohydrate metabolism, it seems certain that it is an intermediate product perhaps in some alternative path. It is suggested that its accumulation in adult vitamin B_1 deficiency may be due to a failure of glutathione (glyoxalase coenzyme) which would result in the accummulation of methylglyoxal. The best therapeutic results have always been obtained with yeast preparations, and yeast is rich in glutathione. Is it possible that the pyruvic acid accumulation of vitamin B_1 deficiency inhibits the action of glutathione on methylglyoxal ? In infant beriberi the infant may be poisoned by the methylglyoxal, without glutathione being present in the mother's milk, whilst the mother escapes symptoms possibly as a result of excretion in the milk. It is not definitely known whether methylglyoxal is toxic ; it may even be an essential metabolite in heart muscle which, in the absence of glutathione, cannot be utilized, with the result that the heart fails. Our views on the aetiology of beriberi, if we regard it in terms of pure thiamin deficiency, may need considerable revision. It should be recognized that isolated cases of infant beriberi may occur in Britain and would not be recognized by anyone unfamiliar with the symptoms, a description of which is given. *H. N. Green.*

CASTELLON (M.). Pellagra. [**Pellagra.**]—*Rev. Argentina de Dermatosifilologia.* 1942. Vol. 26. Pt. 1. pp. 41–50. [21 refs.]

The author, after some remarks on pellagra in general, such as are to be found in all text-books, speaks of 33 cases under his personal observation in the four years, 1938–41. Sixteen were males, 17 were females ; 10 and 13 respectively showed a complete picture of the disease, five and two had a few of the symptoms, and one and two

presented pellagral erythema only. Five men and four women died. Three of the women had tuberculosis also, one man and one woman were suffering from L.I. (ano-rectal syndrome), one man had secondary and one woman tertiary syphilis. *H. Harold Scott.*

PURCELL (F. M.). **Nutritional Glossitis and Vitamin B_2 Therapy.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. May 5. Vol. 35. No. 6. pp. 323–326.

The author describes the cases of six schoolboys in the Gold Coast who developed sore tongue and, in most instances, scrotal dermatitis, while in a boarding school. Such cases are not uncommon in schools and prisons ; the diet (and, indeed, the general diet in the Gold Coast) tends to be poor in riboflavin. Treatment with nicotinic acid failed to improve the condition, but all the patients were cured in a few days by riboflavin. The condition arises apparently in association with change from home to school diet, yet an attempt by questioning to determine essential differences between the two did not lead to a satisfactory solution.

The work of other observers in the tropics is recalled, and the fact that no consistently good results in the condition have been obtained by the use of nicotinic acid alone is referred to. There appear to be two syndromes, the nicotinic acid and the riboflavin syndromes, and glossitis may be the sole minor symptom of either of them. If the glossitis is accompanied by cheilitis, scrotal eczema and perhaps dimness of vision, it is likely to be due to lack of riboflavin. If it is accompanied by diarrhoea and pellagroid dermatitis it is likely to be due to lack of nicotinic acid. " Both deficiencies are variable components of pellagra."

The author notes that dimness of vision has been a symptom in the Gold Coast and elsewhere, and that the patients concerned, though presenting no other sign of vitamin B deficiency, responded rapidly to treatment with marmite. *C. W.*

DUCKWORTH (Geoffrey). **Ariboflavinosis. Report of Two Cases.**—*Brit. Med. Jl.* 1942. May 9. pp. 582–583.

The author reports two cases in which he believes the condition to be that to which American writers have assigned the term ariboflavinosis. [While the clinical description bears some resemblance to that condition, on the whole the cases are unconvincing and it must be remembered that there are other causes for cheilosis and angular stomatitis than riboflavin deficiency. In both cases local treatment was given and the patients were only seen two and three weeks later, so that the therapeutic test is of no value.] *H. S. Stannus.*

HAEMATOLOGY.

NAPIER (L. Everard) & EDWARDS (M. I. Neal). **Anaemia in Pregnancy in Calcutta. An Analysis of Haematological and Other Data from 529 Pregnant Women.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1941. Dec. Memoir No. 33. pp. iv+135. With 7 graphs.

Although previous papers of the authors have dealt with much of the ground covered by the present memoir, this latter forms a convenient summary of their views on anaemia in pregnancy.

Blood examinations were made of 128 "normal" non-pregnant women, 64 "normal" pregnant women and 467 clinically anaemic pregnant women. The anaemias were divided into severe, moderate and slight grades, and, by a cross division, into microcytic, normocytic and macrocytic types. The "normal" pregnant women showed a lower haemoglobin level than the "normal" non-pregnant group, but no progressive reduction of haemoglobin occurred during pregnancy although the cell size increased as pregnancy progressed; a similar increase in cell size occurred in the anaemic pregnant women, but the type of anaemia, macrocytic or microcytic, tended to remain constant throughout the pregnancy. The large majority of cases showed evidence of iron deficiency, most prominent in the microcytic types, due probably to the iron intake being insufficient for the needs of pregnancy. This deficiency, although widespread, is, however, of secondary importance since the majority, as well as the most severe, of the anaemias were macrocytic. The cases coming under observation early in pregnancy were commonly macrocytic, and macrocytic anaemias were common in primigravidae independently of age, although microcytic anaemia was commonest among older women. There was a marked association between poverty and anaemia, between vegetarianism in the richer classes and macrocytic anaemia, and between purdah and microcytic anaemia. Macrocytosis showed a significant correlation with diarrhoea, vomiting, oedema, enlargement of the liver and spleen, hyperbilirubinaemia, reticulocytosis and severe anaemia, and a positive Wassermann reaction. Correlation with economic status shows that the macrocytic type of anaemia is nutritional in origin although other factors appear to be concerned. In some ways it suggests a comparison with the toxaemias of pregnancy while its correlation with enlargement of the spleen and liver, hyperbilirubinaemia and reticulocytosis points to some haemolytic factor. The positive Wassermann reaction suggests an infective aetiology, while there were also symptoms of gastro-intestinal dysfunction.

Maternal deaths were commoner in the macrocytic group and prematurity and early death of the child showed a high correlation with severe anaemia and macrocytosis. Post partum haemorrhage is commoner in the moderate than in the severe cases of anaemia.

Prophylaxis and treatment obviously include prenatal examination for the detection of anaemia, inquiry into the diet and correction of any deficiencies. A pint of milk daily is considered a minimum requirement. Vitamin B complex and iron should also be given and liver extract is required when the anaemia is macrocytic and hyperchromic; sepsis or infection such as malaria should be treated. Failure to respond to such anti-anaemic treatment may require blood transfusion which is best given by the drip method, but intramuscular injections of whole blood, 20 cc. on alternate days, may be simpler and seem hardly less effective. *F. Murgatroyd.*

Schleicher (Emil Maro). **The Origin and Nature of the Cabot Ring Bodies of Erythrocytes.**—*Jl. Lab. & Clin. Med.* 1942. May. Vol. 27. No. 8. pp. 983–1,000. With 1 plate & 15 figs. [47 refs.]

Cabot [*Jl. Med. Res.*, 1903, Vol. 9, p. 15] originally suggested that the ring-like structures described by him in certain erythrocytes represented nuclear remnants, one common view being that they are identical with nuclear membrane, but the present author disagrees

with this conception for a number of reasons. In over 2,150 bone marrow aspirations, covering practically all well-known disorders of the blood, he has in no instance observed a greater number of Cabot's rings in the marrow preparations than were seen in those made from the peripheral blood. Furthermore, the scarcity of the structures is the rule rather than the exception in severe erythroblastic anaemias and toxic anaemias associated with erythroblastaemia and icterus which lead by their very nature to severe disturbances of the denucleation process. Dark field examinations have never revealed that Cabot's rings are preformed structures. The author believes that the rings are neither nuclear remnants nor are they identical with nuclear membrane but that they are laboratory creations, the expression of cellular degeneration induced by haemolytic agents, and that they are formed of aggregated and denatured colloid protein. The toxic and haemolytic anaemias furnish for the most part the material for Cabot's rings in routine blood smears, and there is little doubt that haemolysis plays an important rôle as a preconditioning factor for the production of the structures. They can be produced at will by delaying the drying of the blood film, and from a series of experiments with films, not only of blood but also of egg protein, the author believes that the mode of their formation is as follows: A specific haemolytic agent (bile acid) injures the cell envelope by producing changes in the lipoprotein constituents of its surface layer, which not only influences its permeability but may also lead to microscopic tears in the envelope. This physio-chemical change encourages dissociation of the lipoproteid layers leading to separation of normally fused layers, the irregularity of the splitting being responsible for the variability of the flatness and thickness of the rings. This segregation of protein layers also occurs during the drying process. The staining variability depends on the character and quantity of the substance making up the ring, its molecular thickness and the momentary physical state of the ring constituents. *F. Murgatroyd*

VENOMS AND ANTIVENENES.

Bertrand (Gabriel) & Vladesco (Radu). Sur l'action hyperglycémiante des venins de serpents. [**Hyperglycaemia due to Snake Venoms.**]—*Ann. Inst. Pasteur.* 1940. July. Vol. 65. No. 1. pp. 5–12.

The work reported in this paper is the same as that previously recorded [see this *Bulletin*, 1940, Vol. 37, p. 463] except that two additional venoms have been investigated, bringing the total to 16. In all cases the blood sugar was increased in guineapigs after injection of venom of either the Colubridae or the Viperidae tested. The substance responsible for this action, named by the authors hyperglycaemin, is not identical with echidnase (characteristic of the Viperidae) or neurotoxin, and it is equally potent in the yellow and the colourless venoms of *Vipera aspis*. *C. W.*

Bertrand (Gabriel) & Vladesco (Radu). Sur la variation cyclique annuelle de toxicité du sang de la vipère. [**The Annual Variation in the Toxicity of Viper Blood.**]—*Ann. Inst. Pasteur.* 1942. Jan. Vol. 68. No. 1. pp. 51–57.

The authors recall the long known fact that toxic substances, similar to the venoms, are to be found in the blood or serum of poisonous snakes [it will be remembered that the opinion has been expressed that venom is a product of tissue metabolism, that it is present in snake blood and is extracted from the blood by the poison glands, see this *Bulletin*, 1939, Vol. 36, p. 567]. They found, however, that the toxicity of the blood of *Vipera aspis* varied according to the season of the year as well as according to the locality in which the snakes are found. Virulence is least in spring and greatest in autumn. The same is probably true of venom from the glands, though the authors admit that the few experiments they were able to carry out, because of shortage of guineapigs, suggest rather than prove this.

They conclude that, probably as a result of winter hibernation, the production of venom is low in spring, to increase with the activity of summer. Details of experiments are given. *C. W.*

Boquet (Paul). Rôle du cuivre en quantités infinitésimales dans l'atténuation des venins de *Vipera aspis* et de *Naja tripudians* et d'une toxine végétale, la ricine, par le peroxyde d'hydrogène. [**The Rôle of Minute Quantities of Copper in the Attenuation, by Hydrogen Peroxide, of the Venoms of *V. aspis* and *N. tripudians*, and of Ricin.**]—*Ann. Inst. Pasteur.* 1941. May. Vol. 66. No. 5. pp. 379–396. [34 refs.]

The author has continued the observations previously made [see this *Bulletin*, 1939, Vol. 36, p. 860 ; 1940, Vol. 37, p. 461], in which he showed that the venoms of these two snakes were rendered non-toxic by exposure to hydrogen peroxide, in the presence of minute quantities of copper acting apparently as a catalyst, in a few hours at 37°C. In the absence of copper, hydrogen peroxide has little attenuating power, and copper alone does not detoxify the venoms. The action is slow if the quantity of copper is small and the amount of peroxide low ; it is more rapid at 37°C. than at 4°C. ; it is more marked if the medium is made slightly alkaline, to *p*H 8, than at *p*H 5·5. Traces of iron, nickel and manganese had no action comparable with that of copper, but chromium shows activity similar to that of copper, though less marked.

The combination of copper and peroxide reduces the necrotizing power of the venom of *V. aspis*, but not to the same extent as the coagulating action. The action on the venom of *N. tripudians* is similar to that on the venom of *V. aspis*, but not so rapid ; similar detoxifying action is produced on the vegetable poison ricin. In spite of this, however, these three substances retain antigenic power after treatment [thus resembling the anatoxins produced by treatment of toxins with formaldehyde], and rabbits may be immunized by the treated toxins so that they withstand doses of toxin fatal to controls ; serum from animals immunized by means of treated ricin was capable of neutralizing untreated ricin *in vitro*, and showed precipitins against ricin.

The author reviews work on catalysts and ferments, and concludes that the inhibition of certain ferments is related to their state of

oxidation and to the integrity of their –SH groups. Copper is an oxidation catalyst ; the diastases are particularly sensitive to oxygen in the presence of copper, but papaine and urease recover their diastatic functions, after inactivation by oxidation, on exposure to reducing agents such as hydrogen sulphide, thioglycollate or cysteine. *C. W.*

DERMATOLOGY AND FUNGOUS DISEASES.

PARDO-CASTELLO (V.) & FERRER (Ismael). **Pinta : Mal del Pinto ; Carate.**—*Arch. Dermat. & Syph.* 1942. May. Vol. 45. No. 5. pp. 843–864. With 9 figs. [35 refs.]

This is the best account of pinta known to the abstracter. It may be regarded as an amplification of the excellent chapter devoted to the subject in the new "Stitt," edited by R. P. STRONG. The present article opens with an historical survey from the time when, in 1891, SANDOVAL put forward the parasitic fungal theory of its causation to the present, when it is acknowledged to be due to a spirochaete, *Sp. herrejoni*. MENK in 1926 had noticed that carate patients gave, many of them, a positive Wassermann reaction in the early stages, and all of them a positive in later stages, but in spite of assertions suggestive of its spirochaetal origin it was not until 1938 that SAENZ, GRAU TRIANA and ALFONSO ARMENTEROS reported the discovery of the organism.

The authors then pass to a general account of the disease from the clinical aspect, its evolution, initial lesion and disseminated manifestations with good illustrations of the lesions produced, together with a description of, and a table showing, the cardiovascular and spinal fluid changes observable, the epidemiology of the disease and experimental work on human beings which showed that superficial epidermal inoculation transmits the disease from the infected to the healthy, also that, though it bears certain resemblances to syphilis, the two diseases are distinct and one does not confer immunity to the other. Morphologically, the *Sp. pallida* and *Sp. caratea* cannot be differentiated. No vector is known at present and the authors believe that transmission occurs by personal contact but there is no case recorded of venereal origin. The spirochaete is very susceptible to the action of the arsenicals and of bismuth. Twenty-four hours after an injection of either the spirochaete is no longer demonstrable. The organism has not yet been cultivated. Recent advances are summed up by the authors in these words :—

"Mal del pinto, pinta and carate are one and the same disease, the etiologic agent being a spirochete indistinguishable from that of syphilis and of yaws. This organism has been called Treponema carateum by Brumpt, Treponema herrejoni by León y Blanco, Treponema pictor by Pardo-Castello and Treponema Americanum by Briceño Rossi. Brumpt's denomination has the priority.

"Pinta resembles syphilis and yaws in its general evolution. It begins with an initial lesion, followed by disseminate macules and plaques varying in color from pink to red, slate blue, brown and black and ending in a late dyschromic symmetric stage usually affecting the extremities. The complement fixation and precipitation tests for syphilis elicit positive reactions in 60 per cent. of the cases of the disease in the early stages and

in 100 per cent. in the late stages. The lesions are always superficial and never ulcerate. The early lesions sometimes resemble syphilids, trichophytids, psoriasis and eczema. León y Blanco has called the early disseminated lesions pintids.

" The appearance of the initial and early lesions is described.

" Cardiovascular and cerebrospinal changes have been reported by several authors. In the series of patients studied in this article, 52·1 per cent. showed changes in the spinal fluid similar to those found in cerebrospinal syphilis. In 64·5 per cent. cardiovascular changes were present, most often aortitis.

" Pinta has been transmitted experimentally to man by León y Blanco both in Mexico and in Cuba. His experiences are summarized and the following conclusions drawn : 1. Mal del pinto may be transmitted from person to person by superficial epidermal inoculation. 2. Syphilis and mal del pinto are two separate spirochetoses. Patients suffering from active syphilis may acquire mal del pinto. 3. Mal del pinto confers immunity. Reinfections with the spirochete of pinta are partially successful in the early stages of the disease, but patients with late dyschromic manifestations cannot be reinfected.

" Patients inoculated with Mexican and Cuban strains of spirochetes have parallel manifestations of pinta, showing that both organisms have the same biologic characteristics and pathogenicity. The more limited and chronic type of the disease in Cuba seems to be due to peculiarities of the terrain and not to the spirochete itself.

" The mode of transmission of pinta is probably by personal contact. It is doubtful that a vector exists capable of transmitting the disease."

H. Harold Scott.

STILES (George W.) & DAVIS (Charles L.). **Coccidioidal Granuloma (Coccidioidomycosis) : its Incidence in Man and Animals and its Diagnosis in Animals.**—*Jl. Amer. Med. Assoc.* 1942. July 4. Vol. 119. No. 10. pp. 765–769. With 6 figs. [Refs. in footnotes.]

This paper gives a good summary of coccidioidomycosis. Several of the points have been referred to in previous abstracts in this *Bulletin* [1937, Vol. 34, p. 177 ; 1938, Vol. 35, p. 459 ; 1939, Vol. 36, pp. 101, 507, 508 ; 1940, Vol. 37, pp. 383, 481, 534, 882 ; 1941, Vol. 38, pp. 94, 352, 726–730], but even if some repetition is entailed the present offers an excellent opportunity for giving a review of the whole question as related by the authors.

The granulomatous form was reported from S. America by WERNICKE in 1892, from California by RIXFORD in 1894, and in California cattle by GILTNER in 1918. This form was very fatal in man. The occurrence of a non-fatal influenza-like disease was known in Central California for many years under the names San Joaquin Valley fever, or, shortly, valley fever, desert fever and desert rheumatism, but the connexion between this and the granulomatous form was not recognized until 1936, when DICKSON and GIFFORD showed them both to be due to *Coccidioides immitis*.

Valley fever begins like influenza and in some 5 per cent. of patients an eruption like erythema nodosum or multiforme appears in a few days. The fatality is negligible ; of 432 patients attacked in Kern and Tulare counties between December 1937 and May 1939 all recovered without sequelae.

On the other hand the granulomatous form is chronic and progressive, affecting lungs, skin, lymphatic glands, bones, meninges, and other

parts—the initial lesion usually pulmonary—and has a high fatality rate. In man the lesions may be widespread, in cattle confined to the lungs and thoracic glands.

Infection usually occurs by inhalation of chlamydospores in the dust, more rarely by skin lesions or the mouth. There is, so far, no proof of man to man, animal to animal, or animal to man infection. The spores may be isolated from the soil. At one time the infection went by the name of California disease, but this is as bad a name as Malta fever for undulant fever, for it is found in 16 other States, and has been reported also from South America, Italy and Hawaii. In animals it has been found in trapped rodents in Arizona, in dogs, in sheep, and in bovines in Arizona, Texas, Colorado and Old and New Mexico.

As stated above, in cattle the disease has so far been found limited to the lungs and thoracic glands ; it gives rise to no symptoms and is not found till the animals reach the slaughter-house. The gland affected is enlarged and contains pale, tenacious, yellowish pus, granular and like actinomycotic pus, and the gland is trabeculated. The contents may be caseous, and in old foci calcareous, thus strongly resembling tuberculosis, actinomycosis, actinobacillosis, or abscesses due to *Corynebacterium pyogenes*. Spherules of the fungus are seen in the pus by microscope and cultures may be grown from the pus. Sections show " a granulomatous process consisting of connective tissue, blood vessels, lymphocytes, plasma cells, mononuclear and polymorphonuclear leukocytes, a few eosinophils and giant cells " and various numbers of doubly-contoured spherules, often within a giant cell. The spherules may be surrounded by a rosette of clubs.

The article is illustrated by excellent photomicrographs.

H. Harold Scott.

MISCELLANEOUS.

Voretzsch (Ansetraut-Mahalgart). Ueber die Entwicklung der Gesundheitsverhältnisse insbesondere der wichtigsten Infektionskrankheiten in Deutsch-Neu-Guinea und im Bismarck-Archipel in den Jahren 1922–1935. [**The Principal Infectious Diseases of New Guinea and the Bismarck Archipelago.**]—*Deut. Trop. Ztschr.* 1942. Mar. 1 & 15. Vol. 46. Nos. 5 & 6. pp. 113–132 ; 137–152. [31 refs.]

Otten (L.). De landskoepokinrichting en het Instituut Pasteur 1891–1940. [**The Government Vaccine Institute and the Pasteur Institute (Netherlands East Indies) 1891–1940.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1942. Feb. 3. Vol. 82. No. 5. pp. 196–221. [Refs. in footnotes.]

Mayoral (Pedro). Los monos de Colombia como portadores de germenes de enfermedades tropicales. [**Colombian Monkeys as Reservoirs of Tropical Diseases.**]—*Publ. Lab. Hig. Nariño.* Pasto. 1940–41. pp. 129–151. With 4 figs. [Bibliography.]

The author has examined apparently healthy Platyrrhine monkeys of the genera Cebus, Lagothrix and Ateles. In Cebus and Lagothrix he found ring forms of Plasmodium, " intermediate between the four species found in man," tertian, quartan, subtertian and ovale. In the abdomens of the same genera of monkeys he found adult

filariae 8–20 cm. in length and in the blood embryos of *Acanthocheilonema perstans*. Culicoides is abundant in the district. In two monkeys, one Lagothrix and one Cebus, he saw trypanosomes, possibly *T. cruzi*, as Rhodnius is common in Colombia. Finally, *E. histolytica* was seen in the faeces of a Lagothrix with dysenteric signs.

H. Harold Scott.

EARLE (K. Vigors). **Tropical Ulcer in Trinidad.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Mar. 6. Vol. 35. No. 5. pp. 241–256. [39 refs.]

Among the aetiological factors concerned in tropical ulcer in Trinidad, Earle mentions trauma, malnourishment, insect bites and debility due to hookworm infection, malaria, syphilis, gonorrhoea and alcoholism. He describes the ulcers, noting that he has never, in Trinidad, seen ulcers extend into muscle, periosteum or bone, or encountered the fulminating type associated with gross tissue destruction, sometimes with a fatal termination. The form which begins as a papule may be associated with insect bites, especially of Culicoides.

Most ulcers occur in the lower part of the leg. Lymphadenitis is rare, and pyrexia and constitutional disturbances are apparently uncommon in Trinidad. In treatment rest is important ; concomitant diseases should be dealt with and the diet should be adequate. For local application copper sulphate solution (1 in 150) is used to clean up the ulcer, and is followed after about 48 hours by a paste of cod liver oil 40 per cent., vaseline 60 per cent. applied under elastoplast. The beneficial effect of cod liver oil is attributed to vitamin A, but as cod liver oil has a most objectionable smell after a short time on the ulcer, and as whale oil is free from this disadvantage, the latter may be used, though its vitamin A content is less. Sulphonamides by the mouth are useful in acute ulcers but not in those of long standing.

C. W.

HOFF (Amanda) & HICKS (H. Mason). **Transient Pulmonary Infiltrations. A Case with Eosinophilia (Loeffler's Syndrome) associated with Amoebiasis.**—*Amer. Rev. Tuberculosis.* 1942. Feb. Vol. 45. No. 2. pp. 194–199. With 2 figs.

Loeffler's syndrome consists typically of transient pulmonary consolidations associated with attacks of asthma, cough, low grade fever, mild leucocytosis with relative eosinophilia (although this latter is sometimes absent) and a slightly elevated blood sedimentation rate. Physical examination is usually negative except for a few moist and sibilant râles over the areas of consolidation. X-ray examination shows consolidations which appear suddenly in various parts of the lung and disappear only to reappear in other positions. The shadows are most frequently found in the lower lung field near the diaphragm and vary in size ; they disappear in approximately a week and usually leave only fine fibrous star-shaped scars.

It is probably an allergic manifestation and Ascaris and Fasciola worms, amoebae and pollen have been suggested as the sources of the allergens in some of the previously described cases.

The present example was in a patient who had suffered from paroxysmal cough for three months, and who presented the clinical picture described above. X-ray examination showed a triangular

shadow about 5×7 cm. extending outwards from the right hilum past the middle of the lung field, there was clouding of the right base laterally and anteriorly, and a diffuse opacity was present in the left second intercostal space. Treated by rest in bed the clinical condition remained unchanged, but another X-ray examination after 17 days showed that the original triangular shadow had almost, and the cloudiness in the second left intercostal space had completely, disappeared. There was, however, a shadow at the right base, medially and anteriorly, about 4×3 cm. in size, and there was a diffuse mottling at the left base which had not been present previously.

The stools contained *E. histolytica* cysts and on treating this infection with injections of emetine the response was remarkable. After the fifth day all the symptoms disappeared and after a further five days the chest was entirely clear, although previously the signs and symptoms had persisted for three months. It is considered, therefore, that the case was an example of Loeffler's syndrome and that *E. histolytica* represented the source of the specific allergen. [See also this *Bulletin*, 1941, Vol. 38, p. 539]. *F. Murgatroyd.*

East African Medical Journal. 1942. Jan. Vol. 18. No. 10. p. 316.—**Removal of a Leech from the Nose.**

The leech could not be seen, even with a speculum, and therefore could not be seized with forceps, but irrigation with strong salt solution was tried, without success. Spraying of both nostrils with 5 per cent. cocaine solution was immediately successful, the leech falling from the posterior nares into the back of the patient's mouth, whence it was coughed out. *C. W.*

Chopra (Ram Nath), Chopra (G. S.) & Chopra (I. C.). *Cannabis sativa* **in Relation to Mental Diseases and Crime in India.**—*Indian Jl. Med. Res.* 1942. Jan. Vol. 30. No. 1. pp. 155–171.

This important paper deals chiefly with the findings in 600 cases of hemp-drug insanity in the mental hospitals of India; the opinions expressed are based partly on a previous study by Sir Ram Nath Chopra and G. S. Chopra of 1,500 cases of hemp-drug addiction.

The Indian Hemp Drug Commission of 1893–1894 found that a "moderate use of these drugs produces no injurious effects except in persons with specially marked neurotic diathesis. Excessive use indicates and intensifies mental instability. Moderate use produces no moral injury whatsoever."

Certain clinical features are common with all narcotic drugs, others are specially associated with the particular drug but are not easy to distinguish because of the great variability of their effects, depending on dosage, individual susceptibility and other factors.

Of the 600 cases of insanity 460 were acute; of these 200 were classed as "acute confusional insanity mania of incoherent type," 75 as "toxic hallucinatory disturbances," 70 as "melancholia," 60 as "recurrent toxic mania" and 10 as "depressive mania"; the 140 chronic cases were made up of 90 of "chronic mania" 30 of "schizophrenia" and 20 of "dementia (secondary to hemp drugs)."

In 40 per cent. of the acute cases the symptoms disappeared under treatment within 24 weeks of the onset. The only ascertained causal factor in 400 cases was the use of the drug, in the remaining 200 cases various other factors entered into the picture ; the chief of these were heredity and alcohol, often a combination of both of these factors. Thirty per cent. of the patients were beggars or *sadhus* (religious mendicants), only 5·83 per cent. were cultivators. The onset was gradual or insidious in 380, sudden in 40, and unknown in 180. The physical condition on admission was good in 230, fair in 200, indifferent in 80, bad in 60, and very bad in 30.

The chief symptoms recorded were :—Incoherence of speech in 280, filthy habits in 284, sleeplessness in 255, destructiveness in 125, abusive and obscene language in 120, noisiness in 120, restlessness in 120, indecent behaviour in 105, homicidal tendencies in 100, delusions in 100, sadness in 90, quarrelsomeness in 65, suicidal tendencies in 60, muttering delirium in 60, and hilarity in 60. In a few cases there was complete silence, talkativeness, exaltation, excitement or childish behaviour.

The special diagnostic features of acute hemp-drug insanity include : its short duration, rapid recovery under withdrawal and treatment, delirium, violent mania, a confused excited appearance, bright shining eyes, congestion of the conjunctivae, noisiness and aggressiveness. In chronic cases the patients are usually hilarious and cheerful ; a large proportion recover under treatment.

The relationship between addiction and crime is fully discussed ; the evidence is somewhat conflicting : on the one hand no less than 132 of 466 *ganja* and *charas* smokers admitted to previous convictions for crime and 68 of 772 *bhang* addicts made the same admission. The authors are not convinced that these figures indicate a corresponding association between hemp drugs and crime ; bad characters are often addicts and poverty resulting from addiction often leads to theft and other crimes. In some cases the use of the drugs is actually a deterrent of crimes of violence, though there are cases in which the drug has been deliberately taken to produce the state of mind that is essential to the commission of violence. The classical example of the use of hemp drugs for the induction of frenzy is the sect of the Hassassins in Persia.

In quite a number of cases indulgence in a single smoke of *ganja* or *charas* was responsible for a heinous crime and not infrequently addiction was the immediate cause of the commission of an offence. The drugs have seldom been used for homicidal or suicidal purposes.

John W. D. Megaw.

MARSHALL (J. F.). **Mosquito-Breeding in Static Water Supplies.**—*Nature.* 1942. May 23. pp. 568–570. [10 refs.]

The erection of numerous open tanks for water storage in urban areas has given rise to much apprehension lest they should prove a source of mosquitoes. There are only three out of the 30 species known to occur in Britain which are at all likely to breed in such places. These are *Culex pipiens*, *Culex molestus* (regarded by the author as a distinct species, though some authors consider it to be a biological race of *C. pipiens*) and *Theobaldia annulata*. *Theobaldia annulata* seems to breed only in water polluted with sewage

or other decomposing matter. It bites man freely. *Culex pipiens* breeds impartially in clear or foul water. It feeds chiefly on birds, rarely if ever attacking human beings. Neither of these species is likely to cause any mosquito nuisance from the tanks. The position in regard to *Culex molestus* is less clear. The mosquito plagues in Thames-side districts of London and in the underground railways seem all to have been due to *C. molestus* breeding in water stagnating under station platforms and between the lines, in flooded cellars and cesspools, in septic tanks and in underground systems of household waste disposal. But knowledge of its natural breeding habits is far from complete. Under favourable conditions it will breed continuously throughout the year. With regard to control measures, even if it should be necessary to control the harmless *C. pipiens* to allay public apprehension, it is most desirable that control should be applied only to tanks in which larvae are actually present. It is to be noted that oil is extremely injurious to tanks with bituminous linings. In such cases coal tar derivatives introduced into 30,000-50,000 times their own volume of the infested water may be employed.

V. B. Wigglesworth.

Roy (D. N.), Ghosh (S. M.) & Chopra (R. N.). **Comparative Efficacy of Different Culicifuges under Laboratory Conditions.**—*Parasitology*. 1942. July. Vol. 34. No. 2. pp. 152–154.

Oil of citronella and a number of other substances were tested as culicifuges in the laboratory by smearing them on the arm and then exposing it in a cage containing large numbers of hungry *Anopheles stephensi*, *Armigeres obturbans*, *Aëdes aegypti* and *Culex fatigans*. The most promising results were given by extracts of pyrethrum. Thus the maximum period of effectiveness of oil of citronella, which was the next best, was two hours; whereas in some experiments mixtures containing Pyrocide 20 (diluted 1 : 20 in kerosene) gave protection for 3–5 hours. The authors suggest a mixture of pyrethrum and coconut oil as a cheap efficient culicifuge. They point out that these strong extracts of pyrethrum are fatal to mosquitoes that rest on the treated part and that even the vapour can paralyse the insect.

V. B. Wigglesworth.

Chin (Yin-ch'ang) & Anderson (Hamilton H.). **Chloro-Hexyl-Meta-Cresol, Related Cresols and Other Insecticides which have Low Toxicity for Mammals.**—Reprinted from *Peking Nat. Hist. Bull.* 1941–42. Vol. 16. Pt. 1. pp. 45–53. [34 refs.]

In their search for a cheap insecticide that can be used as a spray in an aqueous base against mosquitoes or other insects a number of cresol derivatives and other substances were tested. The most active substance found was chloro-hexyl-meta-cresol. This was effective against the fruit fly *Drosophila melanogaster* at a concentration of 1 per cent. in a 1–2 per cent. soap solution, oil and alcohol being thus eliminated. This mixture was equal in toxicity to the pyrethrum spray used for comparison. [The pyrethrin content of the pyrethrum spray is not stated.]

V. B. Wigglesworth.

Swartzwelder (J. C.) & Cali (S. J.). **Human Intestinal Myiasis due to Syrphid Larvae. Report of an Additional Case** (*Eristalis tenax*).—*Amer. Jl. Trop. Med.* 1942. Mar. Vol. 22. No. 2. pp. 159–163. With 2 figs. [13 refs.]

Twenty-one previous cases of intestinal myiasis due to rat-tailed maggots have been recorded in the literature. The case here described was in a child of six who complained of attacks of severe abdominal pain over a period of a month often followed by vomiting, during which on one occasion she had brought up a maggot. Hexylresorcinol was given in a dose of 0·6 gm. and within a few hours seven rat-tailed maggots, larvae probably of *Eristalis tenax*, were passed.

V. B. Wigglesworth.

Séguy (E.). Étude biologique et systématique des sarcophagines myiasigènes du genre *Wohlfahrtia*. [**Biology of the Genus Wohlfahrtia.**]—*Ann. Parasit. Humaine et Comparée.* 1941. Vol. 18. Nos. 4–5–6. pp. 220–232. With 2 figs. [52 refs.]

Sequeira (James H.) & Dowdeswell (R. M.). **"Cat-Itch" from a Pet Lynx.**—*East African Med. Jl.* 1942. Feb. Vol. 18. No. 11. pp. 345–347. With 1 fig.

The patient had an eruption of discrete, minute, raised, red papules over the trunk and upper parts of the extremities; it was completely absent below the elbows and below the upper parts of the thighs. There were no burrows, and scrapings from several of the lesions failed to show parasites, but in view of the similarity of the condition to "cat-itch," and of the fact that the patient kept and frequently nursed a pet lynx, the authors asked that the animal should be brushed over clean paper and that the brushings should be sent for examination. In these brushing two specimens of a mite resembling *Notoëdres cati* were found.

Itch may be derived from any animal, but there is good reason to believe that the parasites cannot establish themselves in man, and that burrowing does not occur. Treatment consists in avoiding contact and the application of soothing and antipruritic lotions. *C. W.*

Gilmore (Hugh R.), Jr., Kean (B. H.) & Posey (Frank M.), Jr. **A Case of Sarcosporidiosis with Parasites found in Heart.**—*Amer. Jl. Trop. Med.* 1942. Mar. Vol. 22. No. 2. pp. 121–125. With 3 figs. [14 refs.]

In the heart muscle of a child in Panama, who died on the way to hospital presumably from malaria, sarcosporidial cysts were discovered during routine post mortem examination of the tissues. Study of the literature shows that this is the twelfth case of human sarcosporidiosis to be recorded. In four of these the infection was in the heart muscles. There was no indication that the sarcosporidial infection, which was a light one, had had any effect on the health of the child. The possibility of confusing a sarcosporidial with a toxoplasmic infection is noted. *C. M. Wenyon.*

Streef (G. M.) & Karmawan (R.). Basaal metabolisme in de tropen, zoowel bepaald volgens Krogh als voorspeld uit polsfrequentie en polsdruk. [**Basal Metabolism in the Tropics determined by the Krogh Method and by Pulse Frequency and Pulse Pressure.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1942. Jan. 13. Vol. 82. No. 2. pp. 72–85.

"1. The basal metabolic rate, determined with the Krogh apparatus on normal male natives and Chinese at Sourabaia (Netherlands Indies), shows an average of 9 per cent. below the Mayo standard of Boothby, Berkson & Dunn. Since normal male Europeans at Batavia gave a nearly similar reduction of the average basal metabolic rate, this reduction is not a racial factor, but, at least for the greater part, may be ascribed to living in the tropics.

"2. A comparison of the basal metabolic rate, obtained by indirect calorimetry, with the rate calculated by the formulas of Read and Barnett for predicting the basal metabolic rate from pulse rate and pulse pressure, shows in most cases a good agreement. In general both methods lead to the same conclusion concerning the basal metabolic rate being normal or abnormal. In four out of 47 observations with patients, however, the prediction formulas led to an erroneous conclusion. In four out of five cases reduction of the basal metabolic rate in consequence of treatment was indicated very well by the prediction formulas.

"Anemia gives clearly too high a rate by the prediction formulas.

"*When there is no opportunity for indirect calorimetry*, the predicting formulas of Reed and Barnett are valuable to ascertain whether the basal metabolic rate is normal or abnormal and to judge of the effect of treatment.

"3. Limits are given for the tropics to indicate a probable or a certain deviation of the basal metabolic rate."

Reed (Alfred C.). **Tropical Neurasthenia.**—*Amer. Jl. Trop. Med.* 1942. Mar. Vol. 22. No. 2. pp. 127–130.

"Neurasthenia has been considered as a rather inexact functional nervous syndrome associated with defective psychological adaptation to environment and the stress of life and characterised by increased fatiguability." The disease must be distinguished from gross organic disease, hysteria, psychasthenia, hypochondriasis, early schizophrenia, the depressive cycles of manic-depressive insanity, and paresis before the appearance of physical signs. The symptoms and clinical manifestations are probably as varied as the elements in aetiology.

The author has already described a group of five patients who complained of asthenia, anorexia, easy tiring, palpitation, languor, variable abdominal pains, often unexplained nausea, vomiting and diarrhoea. In all these cases the systolic blood pressure was below normal. Since then thirteen more cases have been seen: in them also there was marked hypotension with lowering of the blood sodium chloride and increase in the blood potassium. The blood-sugar levels were depressed in most cases.

Improvement followed an increased intake of sodium chloride and a restriction of potassium, but especially the administration of adrenal cortical extract. The conclusion reached was that the syndrome was due to insufficient secretion of the adrenal cortex.

Treatment consisted in the hypodermic administration of 1 to 2 cc. of cortical extract, such as "eschatin," for ten consecutive days. "Best is the dropper method under the tongue using a solution of desoxycorticosterone in propylene glycoll as devised by Evelyn Anderson." Two to four teaspoonfuls of sodium chloride should be given daily with the food and in severe cases the potassium intake should be restricted by eliminating such articles as apples, bananas, dates, figs, potatoes, etc. Ephedrine sulphate ($\frac{3}{8}$ to $\frac{3}{4}$ grain) two to three times daily and benzedrine ($\frac{1}{12}$ to $\frac{1}{8}$ grain) two to three times daily before the middle of the afternoon are of distinct value.

Unsolved questions are whether inherent physical or psychological weakness makes external stresses more potent and what is the influence of dietetic factors. *John W. D. Megaw.*

REVIEWS AND NOTICES.

Scott (Sir H. Harold) [K.C.M.G., M.D., F.R.C.P.Lond., D.P.H., D.T.M. & H.Camb., F.R.S.E., Director, Bureau of Hygiene & Tropical Diseases, etc.]. **A History of Tropical Medicine. Based on the Fitzpatrick Lectures Delivered before the Royal College of Physicians of London 1937–38.**—Vol. 1. pp. xix+1–648. Vol. 2. pp. iv+649–1219. With 13 plates. First published 1939. Second Impression [with Appendix at pp. 1101–1153]. 1942. London: Edward Arnold & Co. [Two Vols. 63*s*.]

That a second impression of this unique work has been called for in war time is sufficient indication of its interest and value. But this impression is more than a reprinted edition. The two volumes of the original edition have been reprinted as they stand, but to the second volume the author has added an appendix of 53 pages, in which he has brought up to date the main course of tropical medical investigation undertaken since the first edition was prepared. This appendix deals with diseases discussed in the earlier sections, and each subdivision of the appendix is related to its proper chapter. When times are better it is to be hoped that the author will embody these additions, and others, in a new edition.

The first edition was reviewed at length in this *Bulletin*, 1939, Vol. 36, p. 791, and it is sufficient for the purposes of the present review to call to mind that the contents include historical accounts of the Navy, Army, Colonies and Dominions in relation to tropical medicine, and of the diseases malaria, blackwater fever, yellow fever, trypanosomiasis, leishmaniasis, leprosy, cholera, plague, undulant fever, relapsing fever, melioidosis, dengue, amoebiasis, ankylostomiasis and tropical nutrition. Further chapters are devoted to the history of the Suez and Panama Canals, the slave trade, and to brief biographies of some of the outstanding pioneers of tropical medicine.

The new appendix contains an account of the work of the Foréami organization in the Belgian Congo, related to Chapter 3 of the original. New work in malaria control is recorded, including a table of the naturalistic measures which have been attempted. Yellow fever has

been much studied in recent years and the course of the investigations is recorded ; an important table is given of insects (including certain ticks) proved to be capable of transmitting the virus by bite—it is surprisingly large.

Work on trypanosomiasis has in the main been an application of known principles of control, save in the field of chemotherapy. Here a new departure has been made in the use of aromatic diamidines, first used by YORKE and his collaborators. Early reports were encouraging, and even more so were the reports of the value of these drugs in leishmaniasis, especially of the antimony-resistant type found in the Sudan. Accounts of these findings are included.

Considerable space is devoted to leprosy, largely to a survey of prevalence. Cholera has provided interesting material for comment, and an account is given of the controversy which was raised by the occurrence in Celebes of an outbreak of apparently typical cholera associated, however, with a vibrio of the El Tor type, hitherto regarded as non-pathogenic. In the section on plague the author reveals his delight in historical research by an account of the opinions of the cause of plague expressed by the Members of the College of Physicians of Paris in the 14th century, chief among which is the influence of sun and stars. The important studies on sylvatic plague in America are briefly dealt with, and an account is given of the vaccines used in India and the East.

Short sections are included on undulant fever, relapsing fever, melioidosis, the plague of Athens in 430 B.C. (which may have been measles), and amoebiasis. In the section on amoebic dysentery and hepatitis the author rectifies an omission from the first issue of this History by referring to the work of CRAIG in the United States on the laboratory diagnosis of amoebic infection, with special reference to the complement fixation test. Craig's results are quoted in some detail. The appendix ends with a discussion of recent work on epidemic dropsy in India ; the problem is not yet solved, but a clear statement, such as this, of progress made, brings to the notice of a reader the complexities inherent in medical investigation, and the necessity for careful measurement and exact work ; it illustrates the need for caution in drawing the conclusion that in disease the one outstanding fact is, indeed, the whole story.

Research in tropical medicine has not halted, and one result of the war may well be a widening of interest and an intensification of enquiry. The history of future developments will need to be incorporated in new editions as time goes on. These volumes reveal a historian of distinguished mind and profound erudition ; to a reader they bring a fascinating story told with accuracy and with gentle humour. *C. W.*

LEWIS'S MEDICAL AND SCIENTIFIC LIBRARY. **Catalogue of Lewis's Medical & Scientific Lending Library, including a Classified Index of Subjects with the Names of those Authors who have Treated upon them. Supplement, 1938–1941.**—168 pp. 1942. London : H. K. Lewis & Co. Ltd., 136 Gower Street, W.C.1. [4s. net (to Subscribers 2s.] [Review appears also in *Bulletin of Hygiene.*]

The last completed Catalogue of Lewis's Medical and Scientific Lending Library gave a list of the Authors and Titles and a Classified Index of Subjects of books added to the library up to the end of 1937.

The Supplement now published, covering the four years from January 1938 to December 1941, lists some 4,000 new books or revised editions added to the library in that period, and forms a useful work of reference for librarians and for readers. Though Lewis's Library was originally established to supply mainly the needs of members of the medical profession, its scope is now far wider and embraces most works of any importance, English, American and foreign (when translated), on Medicine and Science generally, and on a wide range of technical subjects. At the present time when many medical men and scientists find that library facilities are curtailed by reason of evacuation or other war conditions, the continuance of a lending service such as that provided by Lewis's Medical and Scientific Library is a great boon. *R. L. Sheppard.*

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